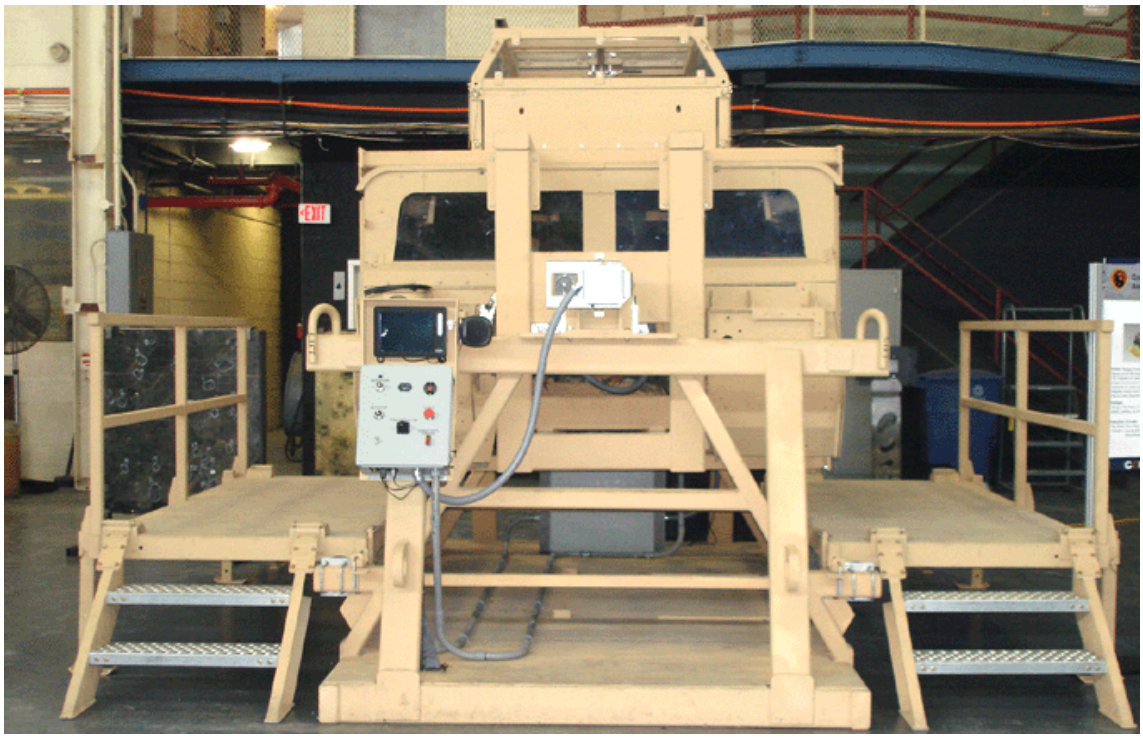
TM 9-HEAT-387-10

FINAL DRAFT TECHNICAL MANUAL

OPERATOR'S MANUAL
FOR
HMMWV EGRESS ASSISTANCE TRAINER (HEAT)



DISTRIBUTION STATEMENT

HEADQUARTERS, DEPARTMENT OF THE ARMY
April 2007

WARNING SUMMARY

This warning summary contains general safety warning and hazardous material warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these precautions could result in serious injury or death to personnel.

WARNING

Failure to place control switches in the off position may result in injury or death to personnel. All control switches must be in the off position before connecting power cord to wall outlet.

WARNING

Failure to comply may result in injury or death to personnel or damage to equipment. Ensure that the power outlet being used for the HEAT is powered by a minimum of a 15 amp circuit breaker.

WARNING

Failure to comply may result in injury or death to personnel. During function test ensure that no crew members are in cab assembly.

WARNING

Injury to personnel may occur. If battery gauge is below four bars, do not start rotation.

WARNING

Injury to personnel may occur. If battery gauge is low do not start rotation.

WARNING

If you hear the word RESCUE during any rotation, immediately return HEAT to 0º positions.

WARNING:

Lack of use or improper use of any seat belt can cause serious personal injury or death.

WARNING:

Improper cleaning or drying of the restraint system can weaken it, can reduce its effectiveness and can result in serious personal injury or death.

WARNING

Failure to place control switches in the off position may result in injury or death to personnel. All control switches must be in the off position before connecting power cord to wall outlet.

WARNING SUMMARY - Continued

WARNING

Failure to do this may result in damage to HEAT and/or components. When operating with class I or II leaks, check fluid levels more frequently. Class III leaks must be reported immediately to your supervisor or to Field Maintenance.

WARNING

Injury to personnel or damage to equipment may result if all WARNINGS, CAUTIONS, and NOTES are not followed while performing PMCS

LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: Zero in the “Change No” column indicates an original or work package.

Date of issue for the original manual is:

Original April 2007

TOTAL NUMBER OF PAGES FOR FRONT MATTER IS 5 AND TOTAL NUMBER OF WORK PACKAGES IS 22, CONSISTING OF THE FOLLOWING

Page/WP No.	Change No.	Page/WP No.	Change No.
Title	0		
Warning	0		
List of Effective Work Packages	0		
Title Block	0		
Table of Contents	0		
How to use this manual	0		
Chp 1 title page	0		
WP 0001 (4 pgs)	0		
WP 0002 (4 pgs)	0		
WP 0003 (3 pgs)	0		
Chp 2 title page	0		
WP 0004 (4 pgs)	0		
WP 0005 (3 pgs)	0		
WP 0006 (2 pgs)	0		
WP 0007 (3 pgs)	0		
WP 0008 (2 pgs)	0		
WP 0009 (2 pgs)	0		
WP 0010 (2 pgs)	0		
WP 0011 (3 pgs)	0		
WP 0012 (4 pgs)	0		
WP 0013 (6 pgs)	0		
WP 0014 (3 pgs)	0		
WP 0015 (2 pgs)	0		
WP 0016 (3 pgs)	0		
WP 0017 (1 pgs)	0		
Chp 3 title page	0		
WP 0018 (5 pgs)	0		
Chp 4 title page	0		
WP 0019 (3 pgs)	0		
Chp 5 title page	0		
WP 0020 (2 pgs)	0		
WP 0021 (2 pgs)	0		
WP 0022 (2 pgs)	0		

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON D.C. APRIL 2007

FINAL DRAFT TECHNICAL MANUAL

OPERATOR'S MANUAL
FOR

HEAT (HMMWV EGRESS ASSISTANCE TRAINER)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and blank forms) directly to xxxx. You may also send in your recommended changes via electronic mail or by fax. Our fax number is xxxx. Our email address is xxxx. A reply will be furnished to you.

DISTRIBUTION STATEMENT

HOW TO USE THIS MANUAL

ABOUT YOUR TECHICAL MANUAL

HEAT operators shall familiarize themselves with the format and use of this TECHNICAL MANUAL (TM) prior to operating HEAT. Learning how to use this TM will enable personnel to quickly locate information, gain proper knowledge of the equipment, and shorten the time necessary to complete the required procedure.

Features of this TM are:

a. Work Package Format–This TM is organized in Work Packages (WP). Each WP is an independent, stand-alone data unit. The subject title of each WP is assigned a six-digit sequence number. The first four digits of the sequence number identify the WP, and WPs are positioned in the TM in numerical order using the same four digits. The fifth and sixth digits of the sequence number are reserved for numbering WPs added to the TM as part of a future revision. Each WP is page numbered consecutively, after the sequence number, at the bottom of each page.

b. Text Design–Chapter titles are listed on the front cover for quick reference. Work packages are presented in numeric sequence, e.g. 0001.00; paragraphs within a work package are not numbered and are presented in a title format. Figures supporting operation and maintenance procedures/text are located as close as feasible to their references.

FRONT MATTER - Front matter consists of front cover, warning summary, title block, table of contents, and how to use this manual page.

CHAPTER 1 - INTRODUCTION. Chapter 1 contains general information, equipment description, and theory of operation.

CHAPTER 2 – OPERATOR INSTRUCTIONS. Chapter 2 contains a description and use of operator controls and indicators, and operating procedures under unusual conditions.

CHAPTER 3 – PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS). Chapter 3 provides preventative maintenance checks and services (PMCS),

CHAPTER 4 – TROUBLESHOOTING PROCEDURES. Chapter 4 contains general troubleshooting information, troubleshooting index and trouble shooting procedures authorized at the operator level.

CHAPTER 5 – SUPPORTING INFORMATION. Chapter 5 contains references and Basic Issue Items (BII) list and expendable durable items list.

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CHAPTER 1

GENERAL INFORMATION, EQUIPMENT DESCRIPTION, AND THEORY OF OPERATION FOR HEAT (HMMWV EGRESS ASSISTANCE TRAINER)

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GENERAL INFORMATION
HMMWV EGRESS ASSISTANCE TRAINER (HEAT)

General Information

Tools and Special Tools
NONE

References
TM 9-2320-387-10
TM 9-HEAT-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

Equipment Description

This Work Package provides general information for the HEAT trainer. When using the HEAT trainer, be sure to read and follow instructions and illustrations carefully.

Figure 0001-001 HEAT Assembly

a. **Type of Manual**–Operator

b. **Equipment Names and Model Number**–HMMWV EGRESS ASSISTANCE TRAINER (HEAT), Training Device Number 55-62.

c. **Purpose of Equipment**–The HEAT is a working simulator used to support the U.S. Military as a training aid designed to simulate an M1114 HMMWV roll over.

d. **Maintenance Forms, Records, and Reports-** Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 750-8, Functional Users Manual for The Army Maintenance Management System (TAMMS).

e. **Reporting Equipment Improvement Recommendations (EIR) -** If your HEAT needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. The preferred method for submitting a Quality Deficiency Report (QDR) is through the Army Electronic Product Support (AEPS) website under the Electronic Deficiency Reporting System (EDRS). The web address is: https://aeps.ria.army.mil. This is a secured site requiring a password which can be applied for on the front page of the website. If the above method is not available to you, put it on an SF 368, Product Quality Deficiency Report (PQDR), and mail it to us at: U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-TR-E/PQDR MS 267, 6501 E. 11 Mile Road, Warren, MI 48397-5000. We'll send you a reply.

f. **Corrosion Prevention and Control (CPC) -** Corrosion Prevention and Control (CPC) of Army materiel is a concern. It is important that any corrosion problems be reported so corrections and/or improvements can be made to future items. Corrosion specifically occurs with metals. It is an electrochemical process that causes the degradation to metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is rusting iron. Corrosion damage in metals can be seen, depending on the metal, in the form of tarnish, surface residue or oxidation, pitting, and perforation. Plastics, composites, and rubbers will also degrade. Their deterioration is caused by exposure to heat, oxygen, solvents, or light (typically ultraviolet). An example is deteriorated rubber weather stripping. Degradation from excessive exposure of these elements can be seen in the form of shrinkage, hardening, cracks, and breaks. If a corrosion problem is identified, it should be reported using SF 368, Product Quality Deficiency Report. Use of key words such as corrosion, rust deterioration, or cracking will ensure that the information is identified as a CPC problem. SF 368 should be submitted to the address specified in DA PAM 750-8, Functional Users Manual for The Army Maintenance Management System (TAMMS).

CAUTION

Failure to comply will result in damage to equipment. Whenever the HEAT has been exposed to seawater (salt water) or any aggressive water or chemicals, it must be rinsed with fresh water to prevent corrosion.

g. **Ozone Depleting Substances (ODS)** The use of ODS has been prohibited by Executive Order 12856 of 3 August 1993. The use of ODS in Army equipment is prohibited.

h. **Army Petroleum, Oil, and Lubricants (POL)** Proper disposal of hazardous waste material is vital to protecting the environment and providing a safe work environment. Materials such as batteries, oils, and antifreeze must be disposed of in a safe and efficient manner. Hazardous materials used in the operation and maintenance of the HEAT are listed in the Hazardous Materials List table below. Normal operation, storage, transportation and maintenance of the HEAT does not use or generate toxins other than those identified in this table. Radioactive materials are not used or generated during the fabrication, storage, or transport of the HEAT.

NOTE

* Item is used during maintenance only.

Hazardous Materials List Table

TYPE	QUANTITY	USE	HAZARD
Mobil SHC634	3-3/4 Gal.	Gearbox	Flammability, Toxicity

Table 0001-001 HEAT Assembly

The following references are provided as a means to ensure that proper disposal methods are followed:

- Technical Guide No. 126 (from the U.S. Army Environmental Hygiene Agency (USAEHA)
- National Environmental Policy Act of 1969 (NEPA)
- Clean Air Act (CAA)
- Resource Conservation and Recovery Act (RCRA)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

- Emergency Planning and Community Right to Know Act (EPCRA)
- Toxic Substances Control Act (TSCA)
- Occupational Safety and Health Act (OSHA)

The disposal of Army Petroleum, Oils, and Lubricants (POL) products are affected by some of these regulations. State regulations also may apply to POL. If you are unsure of which legislation affects you, contact state or local agencies for regulations regarding proper disposal of Army POL.

i. **Destruction of Army Materiel to Prevent Enemy Use** The recommended method of rendering the HEAT useless is to destroy its structure and cab using heavy tools, weapons fire, or explosive charges. Procedures for destruction of Army materiel to prevent enemy use can be found in TM 750-244-6, Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use.

j. **Quality of Material-** Material used for replacement, repair, or modification must meet the requirements of this manual. If quality of material requirements is not stated in this manual, the material must meet the requirements of the drawings, standards, specifications, or approved Engineering Change Proposals (ECP) applicable to the subject equipment.

k. **Safety, Care, and Handling-** Observe all warnings, cautions, and notes prior to operating and servicing equipment. If uncertain how to perform any operator's procedure, ask your supervisor for assistance.

l. **Metric System-** Equipment data is presented in U.S. standard measurements followed by metric equivalents. The HEAT requires the use of both U.S. standard and metric tools.

NOMENCLATURE CROSS-REFERENCE LIST

Common Name	Official Nomenclature
HEAT	HMMWV Egress Assistance Trainer

LIST OF ABBREVIATIONS

AAL	Additional Authorization List
AEPS	Army Electronic Product Support
BII	Basic Issue Items
CAA	Clean Air Act
CAGEC	Commercial and Government Entity Code for Manufacturer
CBRN	Chemical, biological, radiological, nuclear
CCW	Counter Clockwise
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLS	Combat Lifesaver
CPC	Corrosion Prevention and Control
CW	Clockwise
E-Stop	Emergency-Stop
EDRS	Electronic Deficiency Reporting System
ECP	Engineering Change Proposals
EIR	Equipment Improvement Recommendations
EPCRA	Emergency Planning and Community Right to Know Act

LIST OF ABBREVIATIONS - Continued

GPU	General Purpose User
HMMWV	High Mobility Multipurpose Wheeled Vehicle
LCD	liquid crystal display
LED	light-emitting diode
METL	Mission Essential Task List
MTOE	Modified Table of Organization and Equipment
NEPA	National Environmental Policy Act of 1969
NPC	National Power Chair
ODS	Ozone Depleting Substances
OSHA	Occupational Safety and Health Act
PMCS	Preventive Maintenance Checks and Services
POL	Army Petroleum, Oil, and Lubricants
PQDR	Product Quality Deficiency Report
QDR	Quality Deficiency Report
Qty Rqr	Quantity Required
RCRA	Resource Conservation and Recovery Act
SOP	Standing Operating Procedures
TAMMS	The Army Maintenance Management System
TASC	Training Audiovisual Support Center
TOE	Table of Organization and Equipment
TSCA	Toxic Substances Control Act
TSP	Training Support Package
TTP	Tactics, Techniques, and Procedures
U/M	Unit of Measure
USAEHA	U.S. Army Environmental Hygiene Agency
WP	work package

END OF WORK PACKAGE

GENERAL INFORMATION
EQUIPMENT DESCRIPTION AND DATA

HEAT DESCRIPTION AND DATA

Tools and Special Tools
None

References
TM 9-HEAT-387-10
TM 9-2320-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

Equipment Characteristics, Capabilities, and Features

The HEAT is a training simulator with the following characteristics, capabilities, and features:

- Egress training has unlimited rotation of rotate 360º rotation in either direction. (**Note:** When HEAT is rotated to 90 º/270º, egress is thru gunner's cage only.)
- Egress training can be conducted at 90º/270º (trainer rolled onto either side) or at 180 º (trainer rolled onto its roof). (**Note:** At 90º, egress is thru gunner's cage only.)
- Cab can be stopped at any position.
- Electrical Drive System
- National Power Chair (NPC) Robotics 24-volt DC electric motor (3600 rpm; 2 hp; NEMA 56C mount) with integrated electric brake
- Textron Power Transmission Model (GEARBOX): HO60, Single Reduction Double-Enveloping Worm Gear Reducer (40:1) with integrated Double Reduction Helical Gear Reducer (26.4:1) (1056:1 Overall Ratio)
- Falk Type G82 Rigid Coupling
- Dodge SOLIDLUBE 700 Series Sleeve Bearing (Sealed Bearing)
- Multiple Power Supply Options
- 24-volt batteries (on board HEAT)
- NATO slave cable
- 110-volt AC (from outside source – rectifier on board HEAT)
- 2 Personnel Required for Setup and Operation
    - 1 operator/trainer for master controls
    - 1 assistant operator/trainer with emergency stop control at the rear of HEAT
- C130 Transportable
    - Height less than 102 in. (HEAT in Stowed position: 97 in.)
    - Width less than 107 in. (HEAT in Stowed position: 106 in.)
    - Length less than 480 in. (HEAT in Stowed position: 177 in.)
    - Current HEAT weight is 13,200 Lbs.

HEAT Weight and Space Requirements

HEAT in Stowed Position

- Height 97 inches
- Width 106 inches
- Length 177 inches

- Weight 13,200Lbs.

HEAT Fully Operational

- Height 121 inches
- Width 182 inches
- Length 177 inches
- Weight 13,200 lbs.

Location and Description of Major Components

1. **LIFTING POINTS–** There are four lifting point for the HEAT assembly, two in the front and two in the rear, the left rear is equipped with a slide out position to avoid damaging the gearbox motor assembly.
2. **OUTSIDE SPEAKER–**Speaker used for verbal communication between HEAT crewmembers and operator.
3. **MIC–**Mic used for verbal communication from the operator to HEAT crewmembers.
4. **TIE DOWN–**Used during shipping to secure HEAT assembly to transport equipment during shipping.
5. **OPEATORS CONTROL PANEL–** From this location the front operator operates the controls for the HEAT assembly. (See WP 006)
6. **CREW DISPLAY PANEL–** From this location the front operator views the crew inside the HEAT assembly and operates the operator's display panel during operation. (See WP 008)

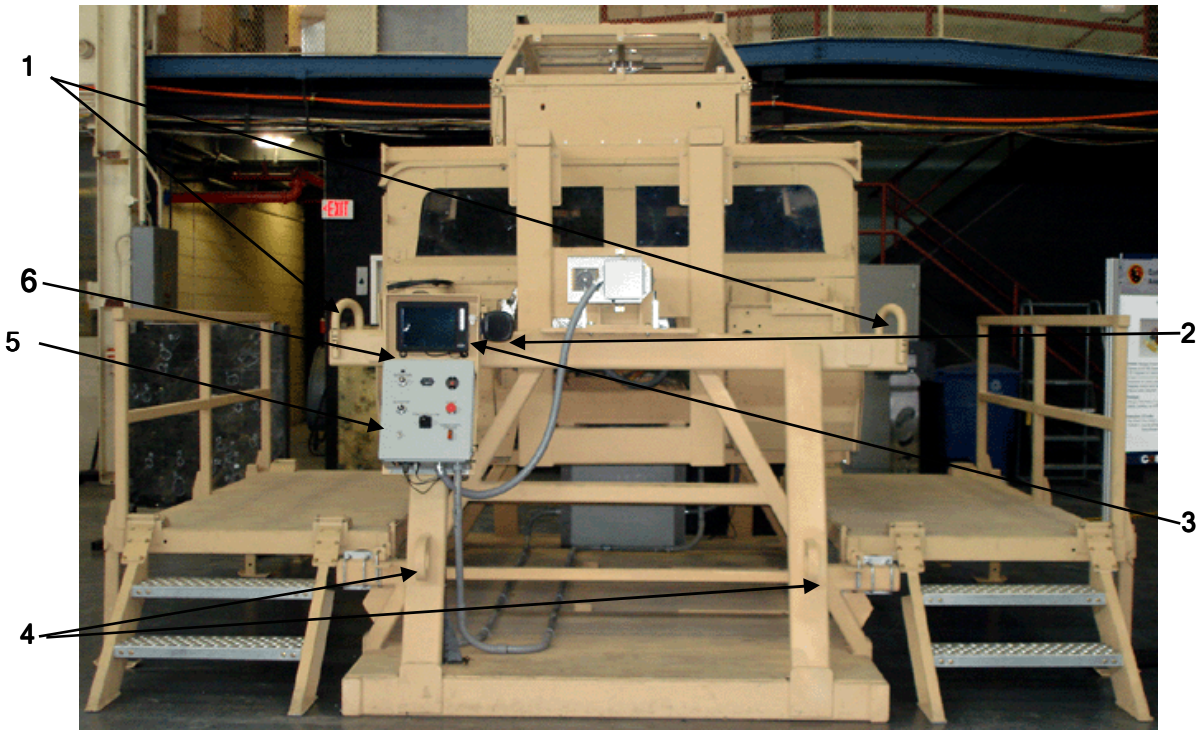

Figure 0002-001 Front View of HEAT

7. **GEARBOX–**David Brown Textron Power Transmission Ratio 28:1, Model No: M032228.BANU1.
8. **M1114 CAB–**Truck, Utility: Up-Armored Carrier, 4X4, M1114 crew cab.
9. **POWER INVERTER –**The inverter uses advanced high-frequency switching technology in the power conversion process. The circuits are similar to those used in power supplies for computers and other modern electronic equipment.
10. **TIE DOWN–**Used during shipping to secure HEAT assembly to transport equipment during shipping.
11. **BATTERY BOX–**Consist of Four batteries and a NATO slave receptacle that provides electrical power for charging when batteries are not charged.
12. **REAR JUNCTION BOX–**Used to house electrical wiring and connection point for rear E-stop.

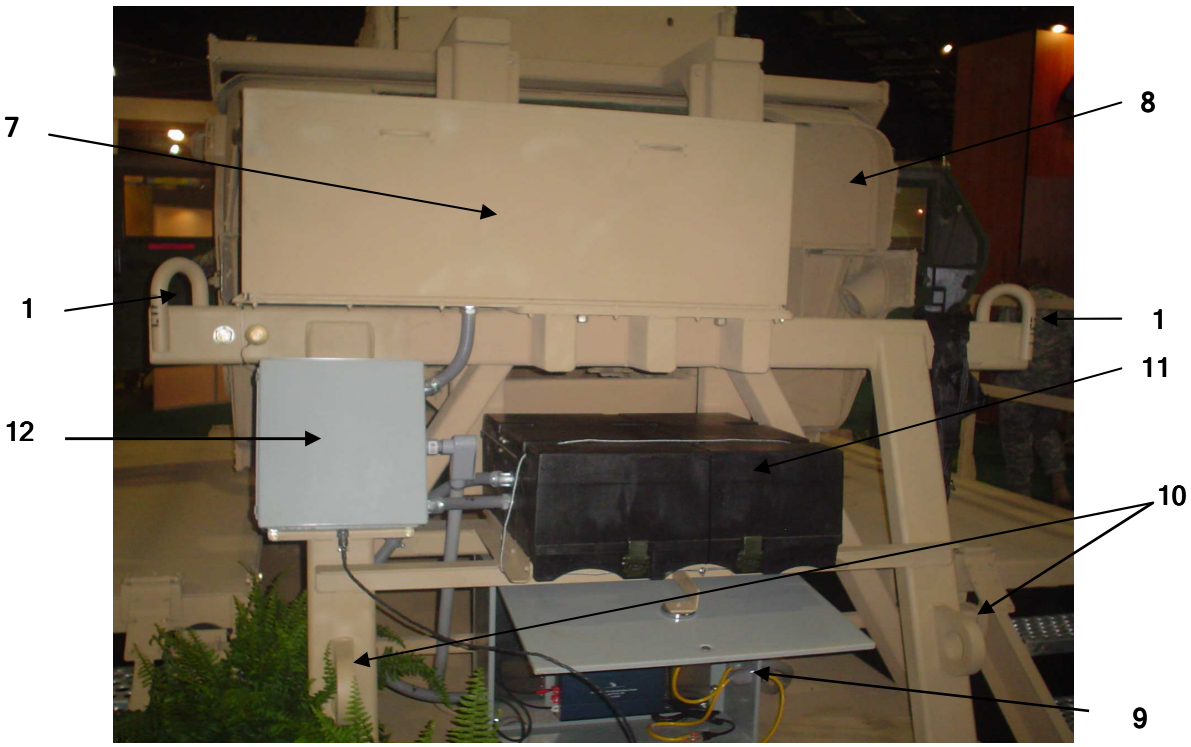

Figure 0002-002 Rear View of HEAT Assembly

13. **REAR E-STOP**–Connected to a tether power cable that is connected to rear junction box. Used to stop HEAT rotation in an emergency condition.

Figure 0002-003 Rear E-stop

END OF WORK PACKAGE

GENERAL INFORMATION
THEORY OF OPERATIONS

General Information

Tools and Special Tools
None

References
TM 9-HEAT-387-10
TM 9-2320-387-10
DA PAM 735-750

Personnel Required
Two GPU

Equipment Conditions
Operational

Theory of Operations

The HEAT is a training simulator used to simulate a rollover of a M1114 HMMWV and its crewmembers. The purpose of the HEAT is to simulate an up-armored HMMWV rollover or roll to left or right, then train the vehicle occupants to successfully egress from the rolled HMMWV by emphasizing teamwork through crew/battle drills.

HEAT tactics, techniques, and procedures train Soldiers on how to avert rollover injuries and preserve manpower and equipment. Knowing what actions to take immediately prior to a potential rollover and immediately following a rollover are vital to the safety of the vehicle's crew. Rollover battle drills, based on unit standing operating procedures (SOP), routinely performed by the vehicle's crew, create understanding of and how to react to the violent chaos that results when a rollover has occurred. HEAT training provides sample battle drills to assist units in creating their own drills to prepare their crews for rollovers.

The HEAT safety philosophy is to train, with an acceptable level of risk (see WP 0022 for risk analysis for HEAT), personnel who travel in the up-armored HMMWV to automatically react to and survive a rollover, then expeditiously egress the rolled vehicle.

The HEAT is used for the following:

- Egress training which can be conducted at 90˚/270˚ (trainer is rolled onto either side) or at 180˚ (trainer rolled onto its roof) (Note: At 90˚ egress is must be through gunners hatch only.)
- Show results of failing to properly load and store equipment, supplies, weapons, ammunition, and other items in the crew compartment of the M1114 HMMWV.

NOTE
Unauthorized activation of the HEAT may endanger life.

Only trainers certified IAW the HEAT TTP may operate the HEAT. HEAT operators must be trained and certified by personnel. As such, commanders must determine who is qualified to train the HEAT operator(s). Commanders may assign other competent personnel (military, civilian employees, or contractors) as HEAT operators/trainers. Ideally, someone who is already a master driver trainer or has experience as an instructor or safety officer/NCO may be designated by the commander as a HEAT operator/trainer. Operator/trainer must be selected not only for their technical qualifications but also for their demonstrated performance, objectivity, and ability to observe and provide constructive comments.

NOTE
The Installation Training Audiovisual Support Center (TASC) (the owner of the HEAT) selects the training site and is responsible for setting up HEAT.

The operator before operating HEAT must:

- Read and be familiar with the HEAT Training Support Package (TSP)
- Review the HEAT Risk Management Worksheet (see WP 0022) and make any local expansions necessary for compatibility with the unit mission essential task list (METL).
- Ensure the HEAT preventive maintenance checks and services (PMCS) and prescribed maintenance are performed (see WP 0018).
- Ensure communications are established in case of emergency.
- Ensure whistles, air horn, or similar signal device are onsite.
- Ensure a Combat Lifesaver (CLS) and lifesaver/first aid equipment are onsite.
- Ensure following motion sickness supplies (medical/hazardous waste)are onsite:

    (1) Shop (wet/dry) vacuum.
    (2) Hose and water source.
    (3) At least two one-gallon pails.
    (4) Latex (or equivalent) gloves.
    (5) Shop rags/towels.
    (6) Motion sickness bags.
    (7) A self-closing trash can and plastic trash bags.

- Ensure the recommended knee-pads and elbow-pads are onsite.
- Ensure safety glasses or goggles (mandatory for eye injury abatement).
- Ensure a fire extinguisher (Class A, B, or C - at least 10 lb) is onsite.
- Ensure flashlights (at least two) are onsite.
- Ensure that the BII (see WP 0021) is on hand (simulated ammo cans, cargo, etc.).
- Ensure hazardous material absorbent material is on hand to recover any oil and/or grease that may leak from the HEAT device and/or to clean up the effects of motion sickness.

The operator must complete the following WPs prior to conducting training on HEAT:

- Connect the power IAW WP 0005.
- Set up the rear E-Stop IAW WP 0007
- Conduct PMCS IAW WP 0018.
- Conduct Functional Test IAW WP 0010. Demonstrate rollover of trainer while empty.
- Observe rollover rate and check for free-floating and unsecured obstacles within the device.

The operator must perform the following during operation:

- Ensure at all the time no one is within six feet of HEAT during operation.
- Watch for visible signals from crew members and assistant operator/trainer.
- Listen for verbal signals from crew members and assistant operator/trainer.
- Be alert to stop operation immediately if required.
- Listen for untypical noises.
- Keep an eye on the trainer at all times.

Instructions for cases of emergency:

- HEAT operator/trainer has to pay close attention to crew members.
- If a crew member signals to interrupt the rotation or shouts RESCUE during a rotation, HEAT has to be brought to a stop and returned to the starting position (0˚) and crew members must be evacuated immediately.

Upon completion of the operation:

- Turn off Motor Power
- Turn off Master Power
- Disconnect the rear E-Stop IAW 0007.
- Disconnect the power IAW 0016.

END OF WORK PACKAGE

CHAPTER 2

OPERATOR INSTRUCTIONS
FOR
HEAT (HMMWV EGRESS ASSISTANCE TRAINER)

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OPERATOR INSTRUCTIONS

PLATFORM SETUP/STOWED

Platform Setup

Tools and Special Tools
None

References
TM 9-HEAT-387-10
TM 9-2320-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

Side Platforms Setup/Platforms are in the inward position

NOTE

The Installation Training Audiovisual Support Center (TASC) (the owner of the HEAT) selects the training site and is responsible for setting up HEAT.

NOTE

Only one platform is shown below. The side platforms are identical on both sides. This procedure covers the platforms setup. Only one platform locking pin location is shown below. The locking pins are both located to the left and right sides of the platform.

1. Remove two inner platform locking pins (1) from each side of platforms.

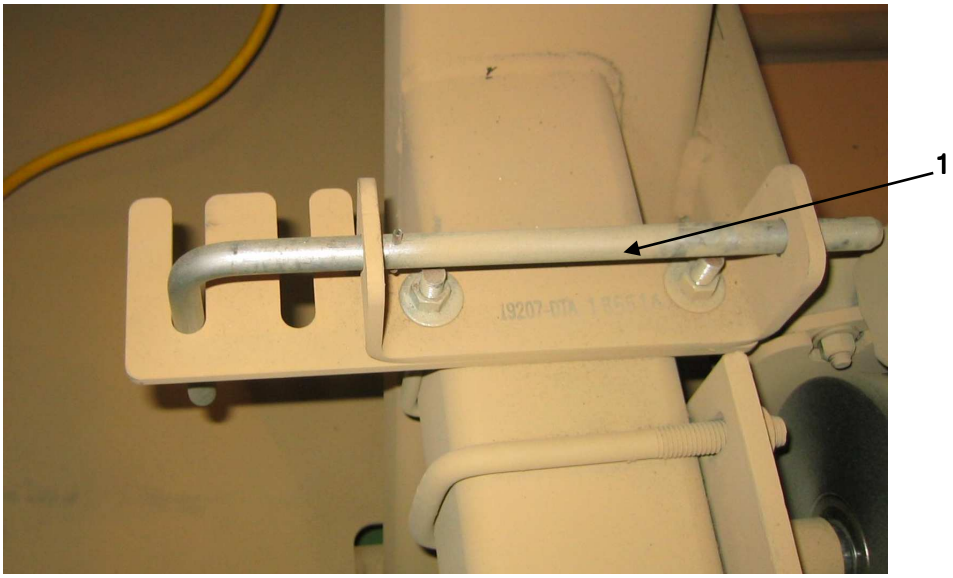

Figure 0004-001 Platform Locking Pin

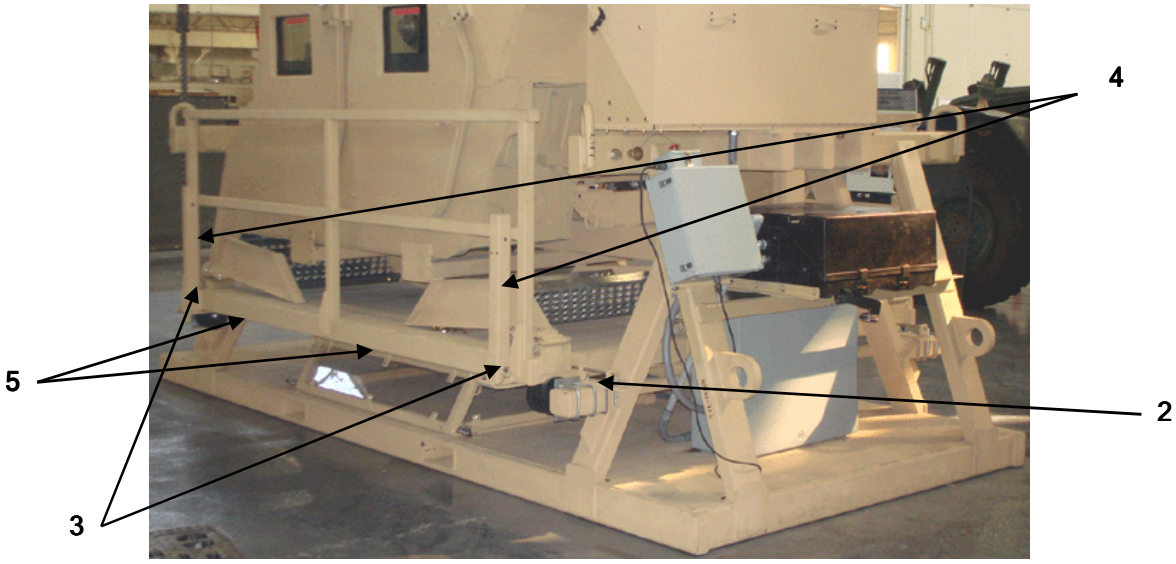

Figure 0004-002 Side Platform (Inward Position)

2. Remove pins (3) from support legs (front and rear) (4).
3. Lower support leg (front and rear) (4) so upper hole on leg aligns with hole on side platform (3).

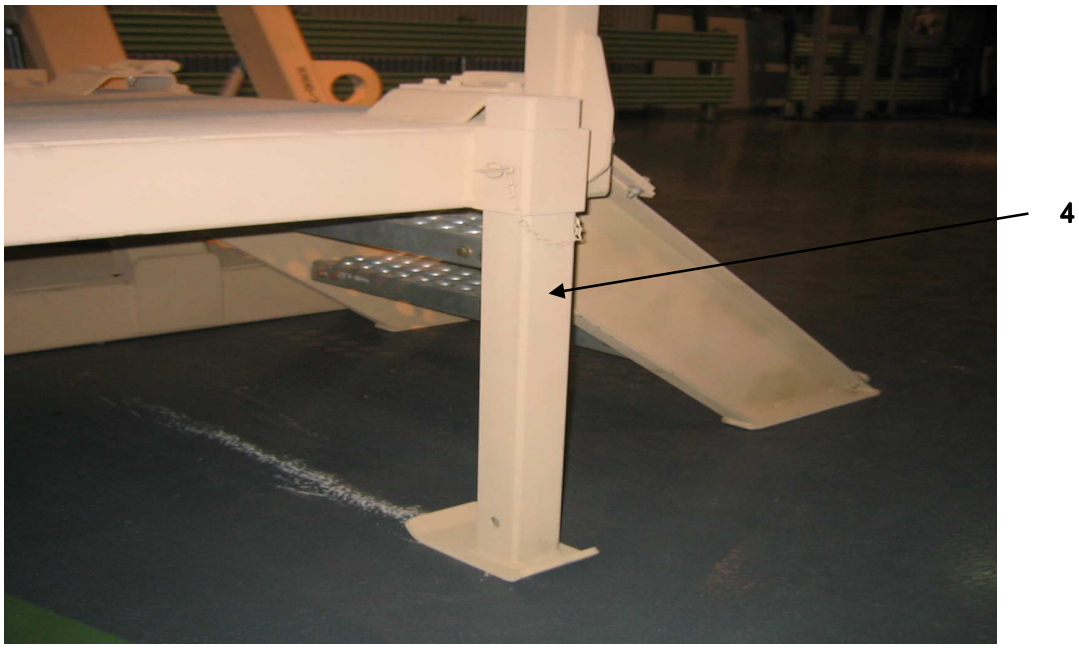

Figure 0004-003 Platform Support Leg

4. Install pin though side platform (3) and support leg (4).

Figure 0004-004 Side Platform Step

NOTE

All support legs and steps are raised and lowered in the exactly same way. The support legs and steps are shown in the lowered position.

Figure 0004-005 Side Platform (Outward Position)

5. Both personnel grasp each end of platform (5) and pull outward in unison until fully extended to stop bracket (6).
6. Grasp steps (7) and rotate to ground.

Side Platforms are in the outward position

1. Grasp steps (7) and rotate steps on to platform.

NOTE

Only one platform is shown below. The side platforms are identical on both sides. This procedure covers the platforms setup. Only one platform locking pin location is shown below. The locking pins are both located to the left and right sides of the platform.

2. Both personnel grasp each end of platform (5) and push inward in unison until the platform is fully under cab assembly (6).

NOTE

All support legs and steps are raised and lowered in the exactly same way. The support legs and steps are shown in the lowered position.

3. Remove pin inside platform (3) and support leg (4).
4. Raise support leg (front and rear) (4) so lower hole on leg aligns with hole on side platform (3).
5. Replace pins (3) into support legs (front and rear) (4).
6. Insert two inner locking pins (1) in each side of the platforms.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

CONNECT POWER

General Information

Tools and Special Tools
None

References
TM 9-HEAT-387-10
TM 9-2320-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

Connect Power Cable Using 110v/220v Wall Outlet

1. Check that master power switch/key (2) is removed from operator's control panel (1).
2. Check that E-stop (6) on control panel is pushed in.

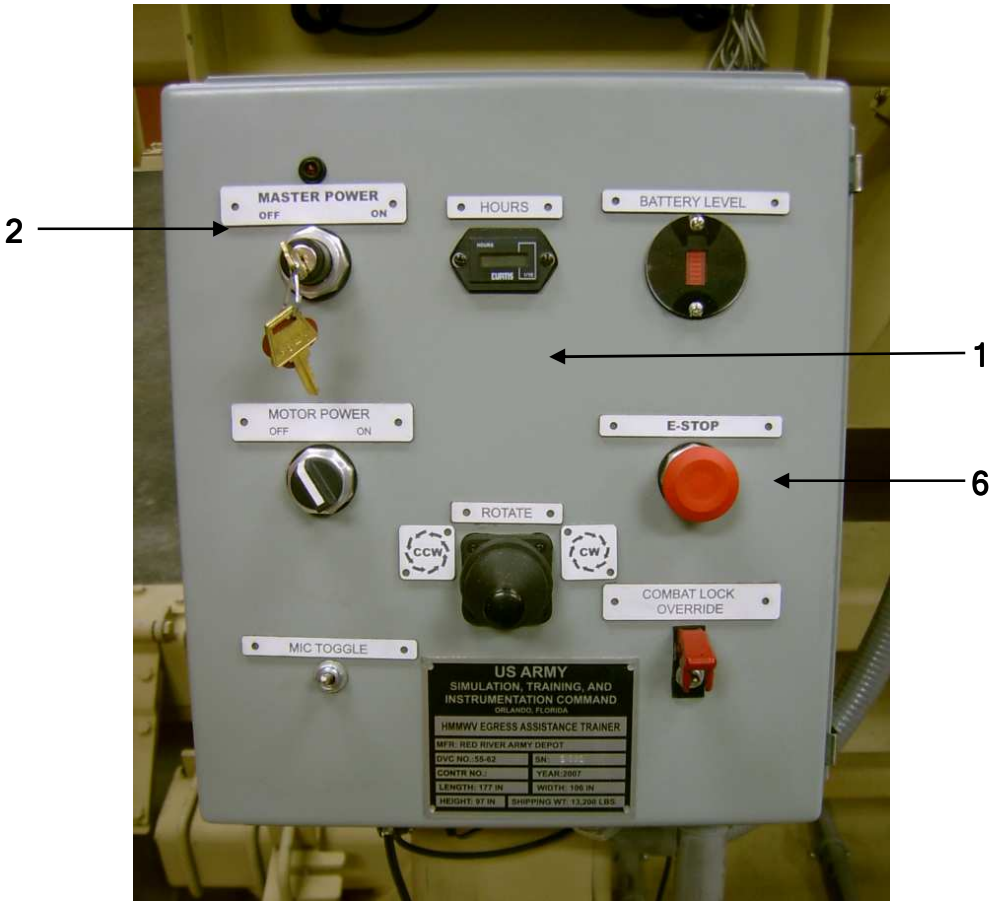

Figure 0005-001 Operator's Control Panel

WARNING

Failure to place control switches in the off position may result in injury or death to personnel. All control switches must be in the off position before connecting power cord to wall outlet.

3. With two hands, raise inverter/charger cover (a).

Figure 0005-002 Inverter/Charger Cover

CAUTION

Do not lean or push on the inverter/charger cover while open.

NOTE

The inverter/charger cover is kept open during operation for cooling.

4. Remove power extension cord and connect (b) to 15 amp 110v/220v wall outlet.

WARNING

Failure to comply may result in injury or death to personnel or damage to equipment. Ensure that the power outlet being used for the HEAT is powered by a minimum of a 15 amp circuit breaker.

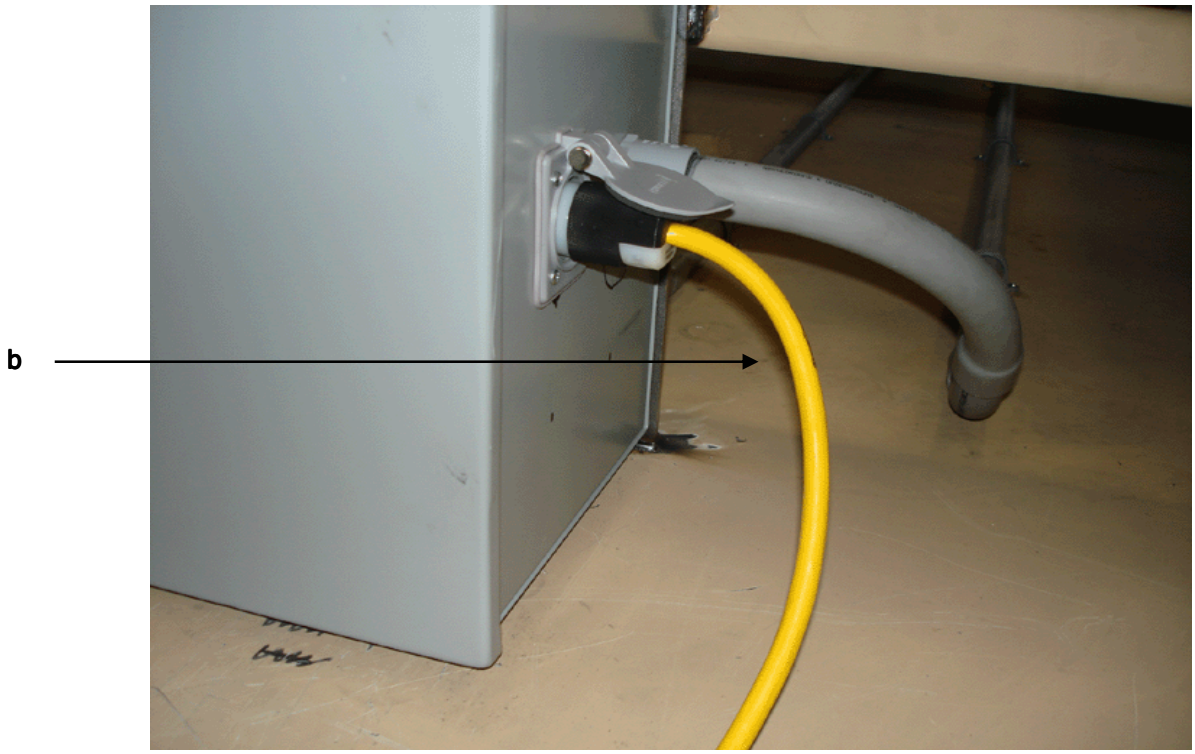

Figure 0005-003 Inverter/Charger Power Cable

5. Turn the charger (d) and inverter switches on (c).

Figure 0005-004 Inverter Switch

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

OPERATOR'S CONTROL PANEL

General Information

Tools and Special Tools
None

References
TM 9-HEAT-387-10
TM 9-2320-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

Operator's Control Panel

The Operator's Control Panel controls the operation of the trainer. It consists of the following components:

1. **OPERATOR CONTROL PANEL–** Contains instrument gauges, switches, and indicator lights used during HEAT operation.
2. **MASTER POWER–** This is a two position key operated master power switch. Used for turning master power on and off. The off position is when the key is turned all the way to the left and the on position is when the key is turned all the way to the right
3. **MASTER POWER LIGHT–** This light will illuminate red when master power switch/key is turned the on position.
4. **HOURS–** This meter displays the hours of HEAT operation. The hour meter starts adding whenever the master power switch/key is turned to the on position.
5. **BATTERY LEVEL–** This displays current battery level charge once both the master power switch/key and motor power switch are turned to the on position.
6. **E-STOP–** This is a two position pushbutton operated button. Pushed in, the E-Stop is used in any emergency situation to stop the rotation of the HEAT cab assembly. Pulled out allows HEAT to resume operations.
7. **ROTATE (CCW/CW) –** The joystick is spring loaded to return to center position when released. Moving the joystick left rotates HEAT cab assembly counter clockwise (CCW). Moving the joystick right rotates HEAT cab assembly clockwise (CW).
8. **COMBAT LOCK OVERIDE–** The switch has a red safety cover that must be flipped up before a rotation is started. This switch is spring loaded and is used to over ride the combat locks on the cab assembly. The combat locks will not override the E-stop safety measure.
9. **MIC TOGGLE–** This switch is spring loaded and is used in the up position to communicate with the crewmembers inside the M1114 cab assembly.
10. **MOTOR POWER–** This is a two position on / off switch. When turned to the right, on position the switch activates a relay to energize the motor and side to side joystick.
11. **DATA PLATE** – Includes the following information: Name of device, manufacturer, device number, serial number, contract number, year of manufactured, length, width, height, and shipping weight.

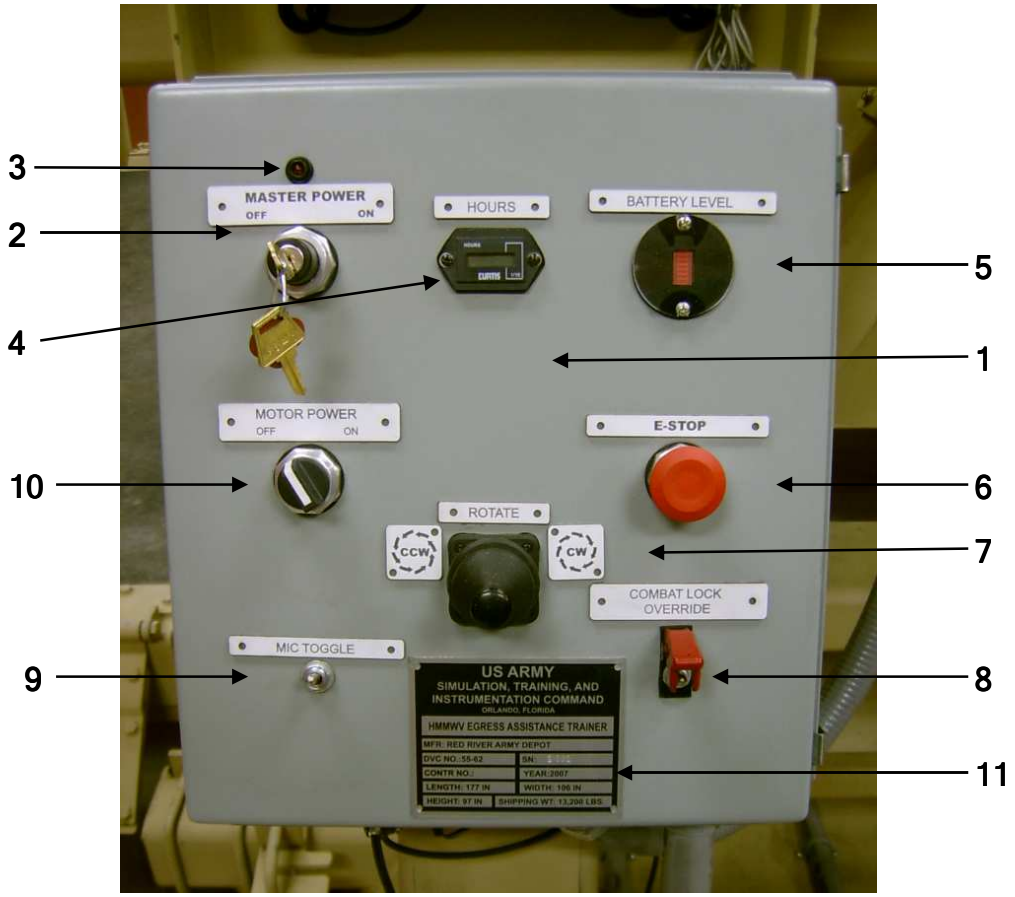

Figure 0006-001 Operator's Control Panel

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

DESCRIPTION AND USE OF OPERATOR'S REAR CONTROL

REAR EMERGENCY-STOP (E-STOP)

Tools and Special Tools
HEAT

References
TM 9-HEAT-387-10
TM 9-2320-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

REAR E-STOP

This is a two position pushbutton operated button. Pushed in, this is used in any emergency situation to stop the rotation of the HEAT cab assembly. Pulled out allows HEAT to resume operations. This operated by the assistant operator/trainer. The assistant operator/trainer has the safety responsibilities for the rear and left side of the trainer.

Figure 0007-001 Rear E-stop

The E-stop is placed in operation

1. Remove the Rear E-stop from the inverter/charger box.

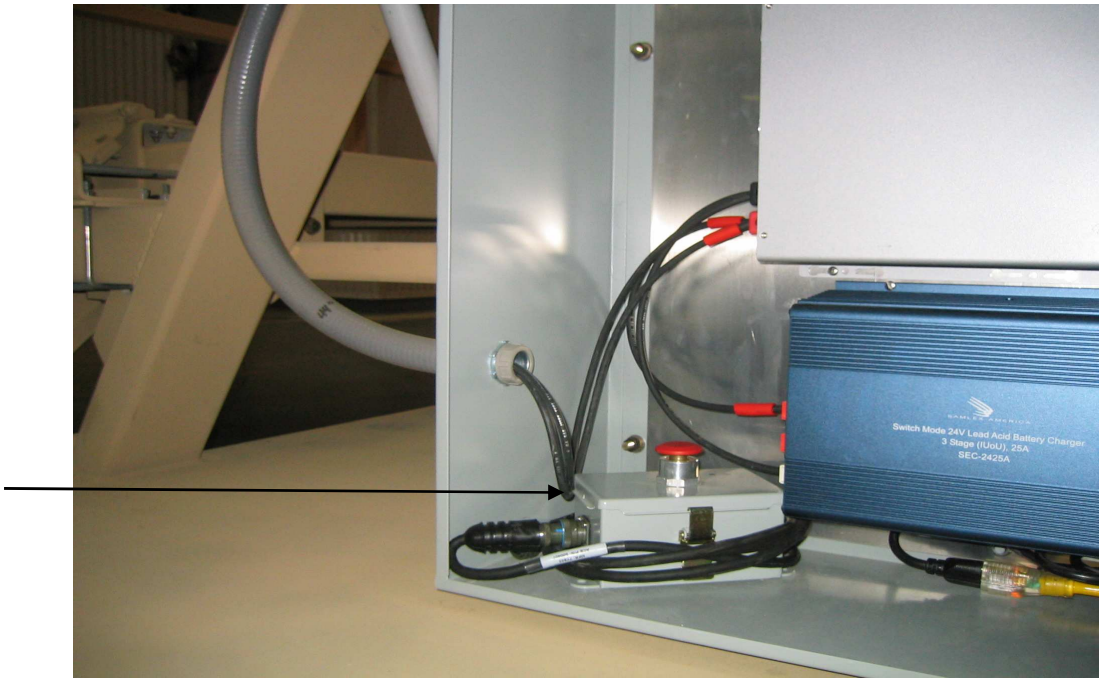

Figure 0007-002 Rear E-stop Stowed in Inverter/Charger Box

2. Plug Rear E-stop in its receptacle.

Figure 0007-003 Rear E-stop Receptacle

Upon completion of the operation

1. Unplug Rear E-stop from its receptacle.
2. Place the Rear E-stop in the inverter/charger box.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

DESCRIPTION AND USE OF OPERATOR'S CREW COMPARTMENT CONTROL

General Information

Tools and Special Tools
None

References
TM 9-HEAT-387-10
TM 9-2320-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

Crew Display Panel

To operate Crew Compartment Display Panel, lift the cover located above the Operator Control Panel.

1. **CREW DISPLAY PANEL**—Displays the status of the following HEAT functions: E-stops, degrees rotated, all four doors safety switches, combat lock override and live camera display of cab crewmembers.
2. **POWER CONTROLS**—When power is first connected to the unit, the unit defaults to the Off state. The Power On-Off button is marked with the I/O symbol. Push this button will turn the LCD on or off. Below the I/O symbol is a Power On indicator, a red LED. Once the unit is connected to a power source, pressing the power button once will turn the unit on and the LED will indicate that the unit is ready. Pressing the power button again will turn the unit off.
3. **BRIGHTNESS CONTROLS**—Located below the Power on LED are two buttons for controlling the brightness of the display. The buttons are represented by a large sun symbol and a small sun symbol. Pressing these will brighten or darken the screen respectively. The unit will automatically reset to a mid-range setting when power is turned off.
4. **SELECT BUTTON**—Select button brings up video options that control the following: horizontal, vertical brightness, black level, contrast, hue, and color.
5. **RIGHT BUTTON**— Used to scroll down the menu and adjust settings.
6. **LEFT BUTTON**— Used to scroll up the menu and adjust settings.
7. **SPEAKER** – Speaker used for verbal communication between HEAT crewmembers and operator.
8. **MIC** – MIC used for verbal communication from the operator to HEAT crewmembers.

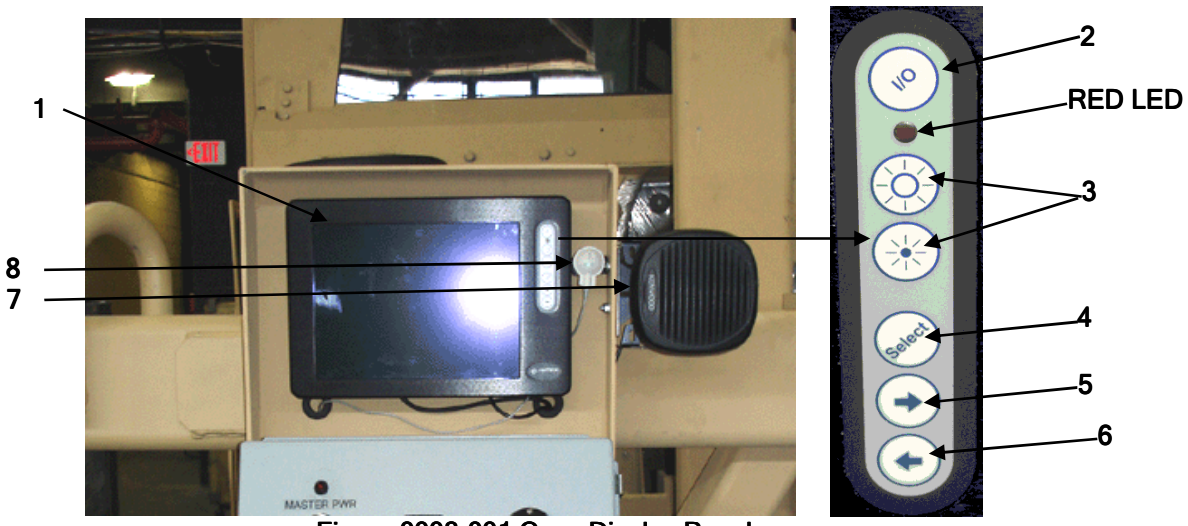

Figure 0008-001 Crew Display Panel

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

DESCRIPTION AND USE OF CONTROLS AND INDICATORS IN CAB ASSEMBLY

General Information

Tools and Special Tools
None

References
TM 9-HEAT-387-10
TM 9-2320-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

Cab Assembly

1. **CREWMEMBER E-STOP–** Located in the cab assembly for crewmember emergencies. This is a two position pushbutton operated button. Pushed in, this is used in any emergency situation to stop the rotation of the HEAT cab assembly, also used during procedure as a safety precaution. Pulled out allows HEAT to resume operations.
2. **CREW SPEAKER–** Receives audio from front operator to crewmembers.
3. **CREW MIC–** This relays audio command from the crewmembers to operator at all times.

Figure 0009-001 Crewmember E-stop

NOTE
Both cameras are identical only right side is shown below.

4. **CAMERAS–** Two inter cab front mounted cameras relay a constant video signal to the front operator's crew panel display.

Figure 0009-002 Cab Assembly Camera

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

HEAT FUNCTION TEST

General Information

Tools and Special Tools
HEAT

References
TM 9-HEAT-387-10
TM 9-2320-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

Function Test

Function Test is conducted prior to any simulation. Function Test is conducted without personnel in the crew compartment in the cab assembly. The purpose of the Function Test is to ensure the trainer is operational and safe to conduct training.

WARNING

Failure to comply may result in injury or death to personnel. During function test ensure that no crew members are in cab assembly.

NOTE

All direction and orientation of rotation is from the operator's location.

1. Perform safety checks

    - Check that Gunners cage slider door is in the closed position.
    - Check that Gunner's hatch on M1114 cab is in the open locked position
    - Check that all windows are up and in the locked position.
    - Check that no personnel or objects are within 6 ft of HEAT
    - Check that all personnel are removed from cab assembly.
    - Check with assistant operator that all is clear.
    - Check that motor power switch is in the off position.
    - Ensure the training locks are engaged.

2. Using front operator's control panel (1) turn master power key switch (2) to the right until red power light (3) is illuminated.
3. Turn on crew display control panel.
4. Check the functionability of all three E-stops. This will require both the operator and the assistant operator/instructor.
5. Set motor power (9) to the On position.
6. Check battery level indicator (5) before starting any rotations. Battery level bars should show four or more before using HEAT or starting a rotation.

WARNING

Injury to personnel may occur. If battery gauge is below four bars, do not start rotation.

7. If battery level indicator (5) displays in the low red allow time for HEAT batteries to charge before starting any rotations

NOTE

HEAT will not rotate when motor power is in the off position. HEAT will not rotate when there are no personnel in cab assembly, unless the combat lock override is in the override position.

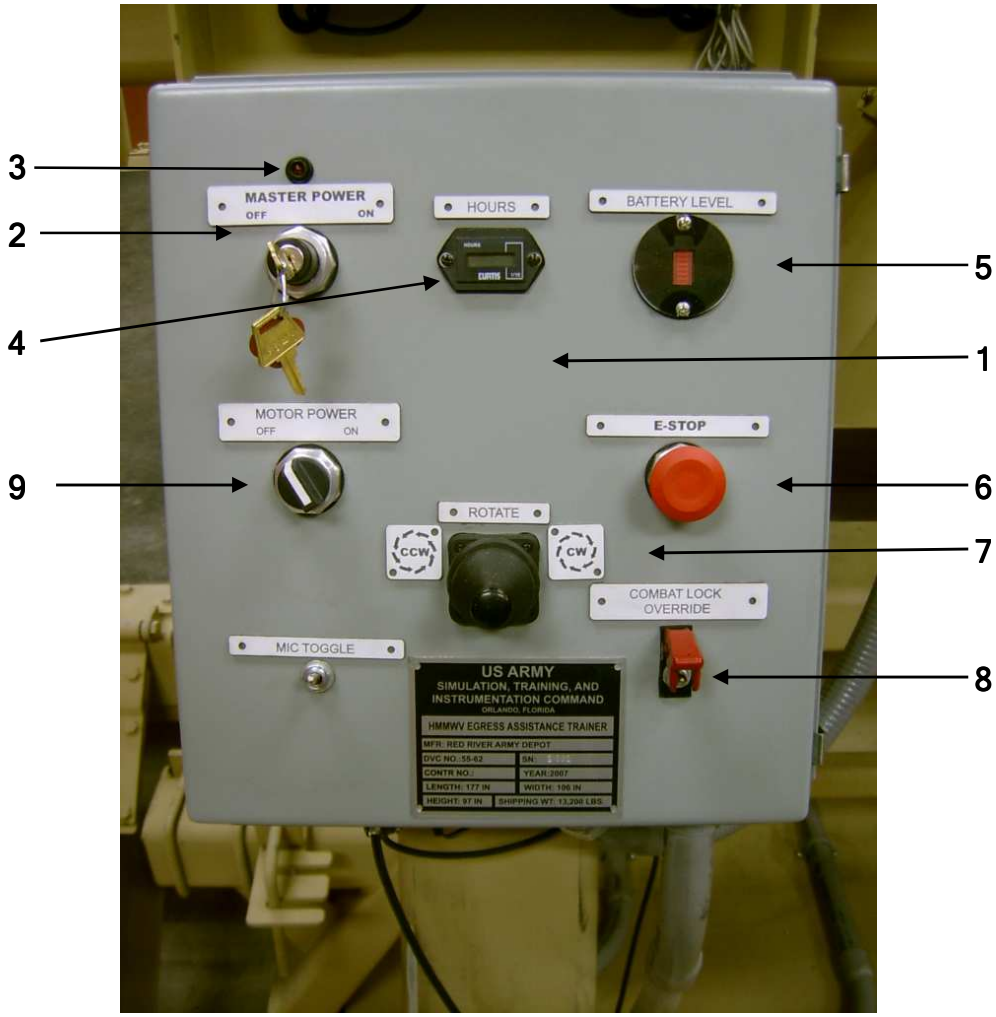

Figure 0010-001 Operator's Control Panel

8. Set the combat lock override (8) in the override position.
9. Observe HEAT and the crew display panel, while moving the ROTATE (CW) (7) to the right until the cab assembly has made a complete 360˚ rotation.

NOTE

While observing the crew display panel, if the degree of incline indicator does not change see WP 0019 malfunction number 6.

10. Observe HEAT and the crew display panel, while moving the ROTATE (CCW) (7) to the left (7) 25˚ until the cab assembly is in 25˚ position. If everything operates properly, rotate the cab assembly back to 0˚ position.

11. Observe HEAT and the crew display panel, while moving the ROTATE (CW) (7) to the right 30˚ until the cab assembly is in a 330˚ position. If everything operates properly, rotate the cab assembly back to 0˚ position.
12. Observe HEAT and the crew display panel, while moving the ROTATE (CCW) (7) to the left 90˚ until the cab assembly is in 90˚ position. If everything operates properly, rotate the cab assembly back to 0˚ position.
13. Observe HEAT and the crew display panel, while moving the ROTATE (CW) (7) to the right until the cab assembly is in an 180˚ position. If everything operates properly, rotate the cab assembly back to 0˚ position.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

PERSONAL RESTRAINT SYSTEM

Personal Restraint System

Tools and Special Tools
NONE

References
TM 9-HEAT-387-10
TM 9-2320-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

Seat belt Operations

1. Design:

   a. The new restraint system has a lap strap (1) and shoulder strap (2) that are inserted into the buckle separately.
   b. Both can be released at the same time by lifting the lever on the buckle. (3)
   c. The lap strap and shoulder strap each terminate in a webbing retractor.

Figure 0011-001 Lap and Shoulder Strap and Buckle

2. Operations:

   a. Insert the lap strap into the lower slot on the buckle, ensuring it is locked in place.
   b. Insert the shoulder strap into the upper slot on the buckle, ensuring it is locked in place.

NOTE

The retractors will automatically lock whenever they sense strap or vehicle acceleration in excess of preset levels. Once activated, the retractor will remain locked as long as there is tension in the strap. Relaxing the pressure on the straps will allow retractors to unlock.

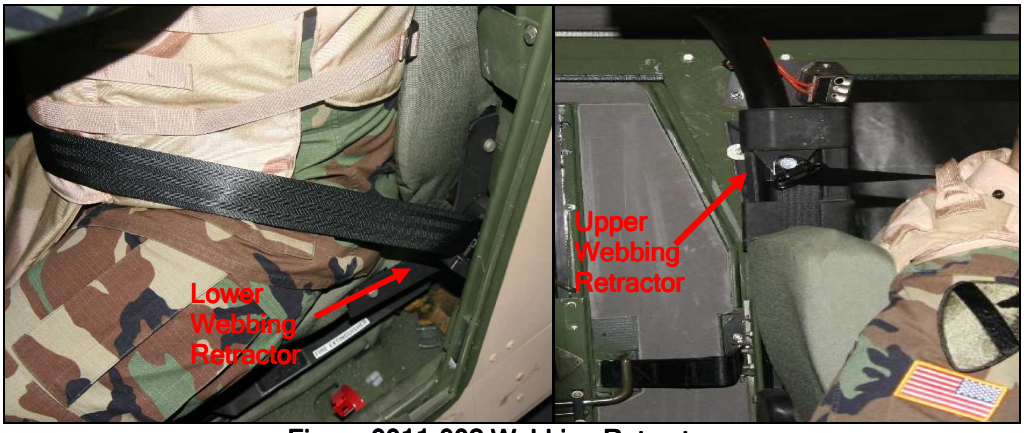

Figure 0011-002 Webbing Retractors

c. Further adjustments are made using the buckle as follows:

1. To lengthen: Locate the adjusting knob on the buckle and pull up until the buckle is free to slide. Move the buckle to the desired position and release the adjusting knob, ensuring that it locks into place.

Figure 0011-003 Adjusting Knob

2. To shorten: Locate the adjusting knob on the buckle and pull up until the buckle moves freely. Move the buckle to the desired position and release the adjusting knob, ensuring that it locks into place.

Figure 0011-004 Adjusting Knob

WARNING

Lack of use or improper use of any seat belt can cause serious personal injury or death.

NOTE

Ensure buckle is adjusted so that it sits at the hip joint of the occupant. Adjust the buckle all the way out, when wearing full battle gear, and all the way in when wearing normal attire/non-battle gear.

NOTE

Ensure that both lap strap and shoulder strap are worn at all times.

NOTE

Ensure that lap strap is always positioned low on the torso/hips and not on the stomach.

3. Safety:

   a. Make sure lap belts are not twisted when worn.
   b. Never wear the belts over rigid or breakable objects (eyeglasses, pens, jewelry, etc).
   c. Never allow belts to rub against sharp objects.
   d. Never allow belts to become damaged by being caught in seat hardware or in the door.

4. Maintenance (Inspection, Modification and Cleaning):

   a. Check seat belts once a month:

      1. Look for cuts, tears, abrasion, and other damage.
      2. Any of the above will greatly reduce the effectiveness and must be replaced.
      3. Make sure buckle is free of any obstructions and locks securely.

   b. Modifications:

      1. Modified belts that have been re-sewn lose their strength and are dangerous in an accident.
      2. Never modify, disassemble, or repair the belts yourself.
      3. Use of non-authorized parts and accessories can reduce the effectiveness of the restraint system.

c. Cleaning:

1. Use soap and warm water only.
2. Do not use solvents.
3. Do not dry belt in the sun or near a radiator.

WARNING

Improper cleaning or drying of the restraint system can weaken it, can reduce its effectiveness and can result in serious personal injury or death.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

GUNNER'S RESTRAINT SYSTEM

Gunner's Restraint System

Tools and Special Tools
NONE

References
TM 9-HEAT-387-10
TM 9-2320-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

Gunner's Harness Operation's

1. What it does:
   a. Keep gunner from being ejected from vehicle during roll-over.
   b. Help stabilize gunner during operation over rough terrain.
   c. Help stabilize gunner during high speed maneuvers

NOTE

These instructions are not intended to replace roll-over drills or hasty evac from this vehicle. They are intended for use in accordance with the gunner's protection kit and roll-over drills together for added protection.

2. Proper donning of the harness is critical. (see picture below)

   a. Orient harness by locating the upper D-ring and bring upper straps over the shoulder per Figure 0012-001.

Figure 0012-001 Gunner Harness

   b. Fit harness per Figure 0012-002.

Figure 0012-002 Fitting Harness

c. Connect vertical anchor strap to attachment ring on harness. (Figure 0012-003)

Figure 0012-003 Vertical Anchor Strap Attachment Ring

d. Ensure lower attachment ring is connected in front of gunner's seat per Figure 0012-004.

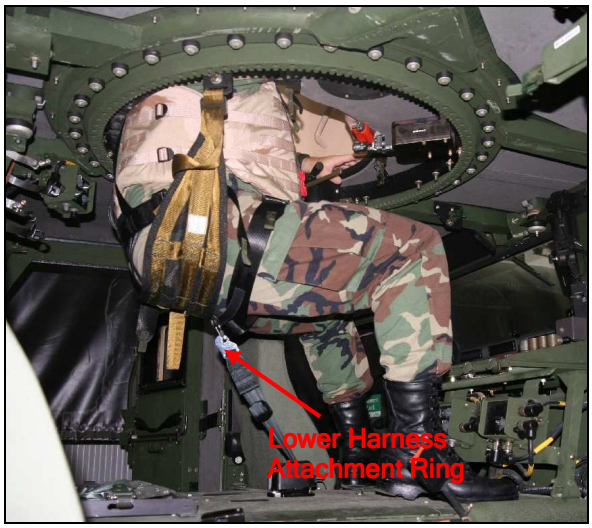

Figure 0012-004 Gunner on Seat

3. Safety Concerns:

   a. Do not rely on the restraint system to prevent injury in the event of a roll-over or vehicle accident.

NOTE

The restraint system is only designed to prevent the gunner from being ejected from the vehicle; it will not pull the gunner back into the vehicle.

   b. Replace the gunner's restraint system following an accident.
   c. Emergency release from the restraint system should always be accomplished utilizing the rotary buckle quick release.

Figure 0012-005 Emergency Release

NOTE

For emergency release of the rotary buckle quick release, press the yellow button and turn. The buckle can be turned in either direction per Figure 0012-005.

4. Recommendations:

   a. Anchor strap can be adjusted as needed; however, any slack in the belt will reduce the effectiveness of the restraint and is not recommended.

Figure 0012-006 Anchor Strap Adjustment

HEAT is equipped with the Improved Gunner's Restraint, follow the instructions below.

Figure 0012-007 Gunner Restraint

Improved Gunner's Restraint System

1. Improvements:

   a. The Improved Gunner's Restraint is distinguished by a push-button quick release, swivel, and adjustable "tail" strap.

      1.) Quick release on "tail" strap allows gunner to quickly exit the vehicle without having to drop the harness.
      2.) The swivel prevents "tail" strap from twisting/binding.

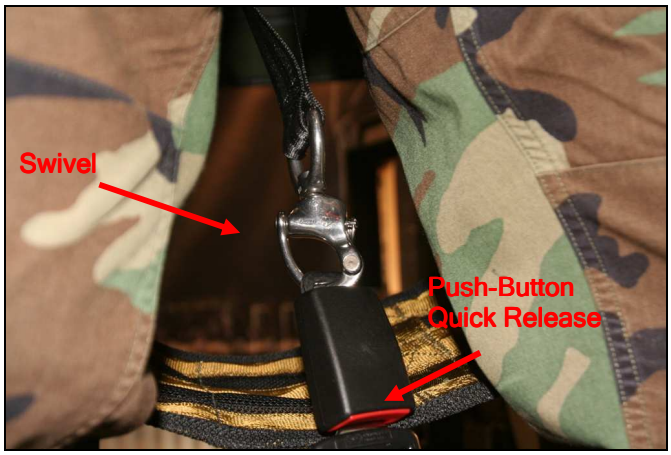

Figure 0012-008 Gunner Restraint Instructions

      3.) The adjustable "tail" strap allows the gunners to lengthen the straps for easier access, but still allow shorter gunners to keep the strap tight enough to provide effective protection.

Figure 0012-009 Gunner's Restraint Adjustment

b. Donning of the harness is the same as the original with the exception of attaching the push-button quick release to the anchor strap.

Figure 0012-010 Connecting Anchor Strap

c. Emergency release from the restraint system can also be accomplished utilizing the rotary buckle.

Figure 0012-011 Quick Release

NOTE

For emergency release of the rotary buckle quick-release, press the yellow button and turn. The buckle can be turned in either direction per photo above.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

SINGLE HANDLE LATCH AND LOCK OPERATING INSTRUCTIONS

General Information

Tools and Special Tools
None

References
TM 9-HEAT-387-10
TM 9-2320-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

SINGLE HANDLE LATCH AND LOCK OPERATIONS

NOTE
All direction and orientation of rotation is from the operator's location

1. Perform safety checks
   - Check that Gunner's hatch on M1114 cab is in the opened locked position.
   - Check that Gunners cage slider door is in the closed position.
   - Check that all windows are up and in the locked position.
   - All personnel are secured to cab using seat belt.
2. To operate the single handle latch and lock from the outside proceed as follows:

CAUTION
Exercise caution when opening the exterior handle to avoid pinching fingers between handle and overlays.

- Pull up on exterior handle until the door latch releases. The door will spring. Pull handle to open.

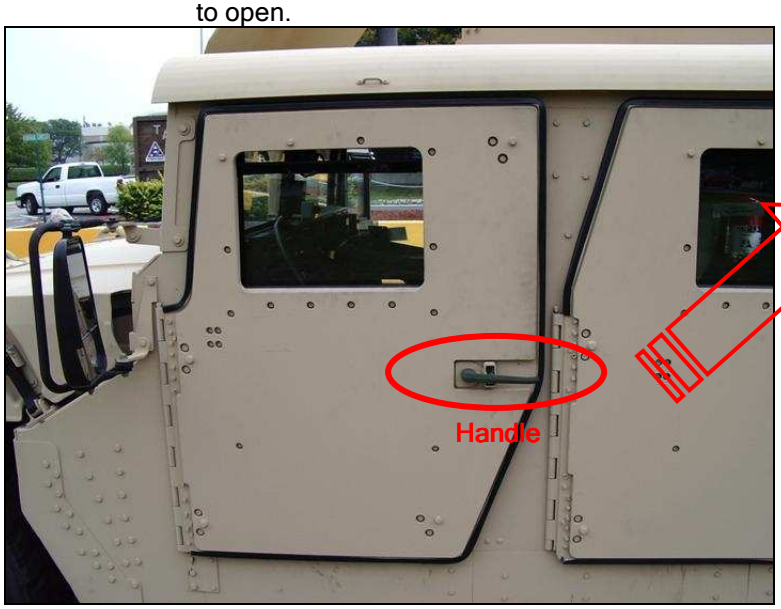

Figure 0013-001 Handle

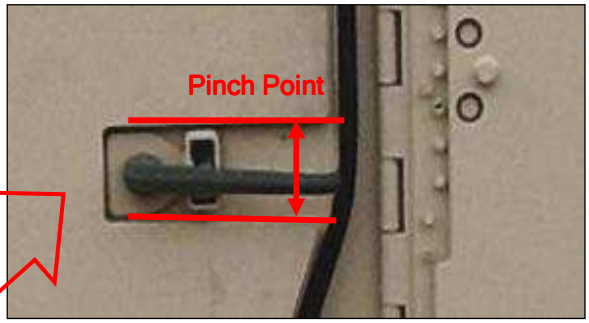

Figure 0013-002 Pinch Point

3. To operate the single handle latch and lock from the inside proceed as follows:

- Using arm nearest the door, place hand on the curved portion of the handle with the hand in the palm down direction. Pull straight back towards the rear of the vehicle.
- While maintaining the pull back force, push down on the curved portion of the handle. The door latch should release. Push door open.

Figure 0013-003 HMMWV Door

4. To engage the combat locks from the inside proceed as follows:
   - Using the arm nearest the door, place hand on the curved portion of the handle with the hand in the palm down direction. Pull straight back towards the rear of the vehicle.
   - While maintaining the pull back force, rotate the handle up towards the window until it clicks into position. The combat locks are now engaged.

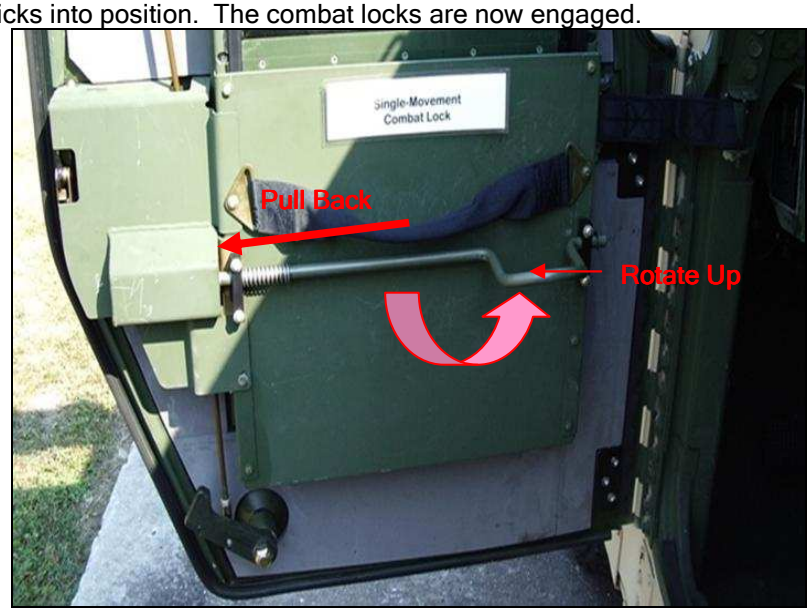

Figure 0013-004 Combat Locks-Engaged

5. To exit the vehicle, with combat locks engaged, in one motion proceed as follows:

- Place hand on the curved portion of the handle and pull straight back towards the rear of the vehicle.
- While maintaining the pull back force, in one swift motion, rotate the handle down and continue pushing down until the door latch releases. Push door open.

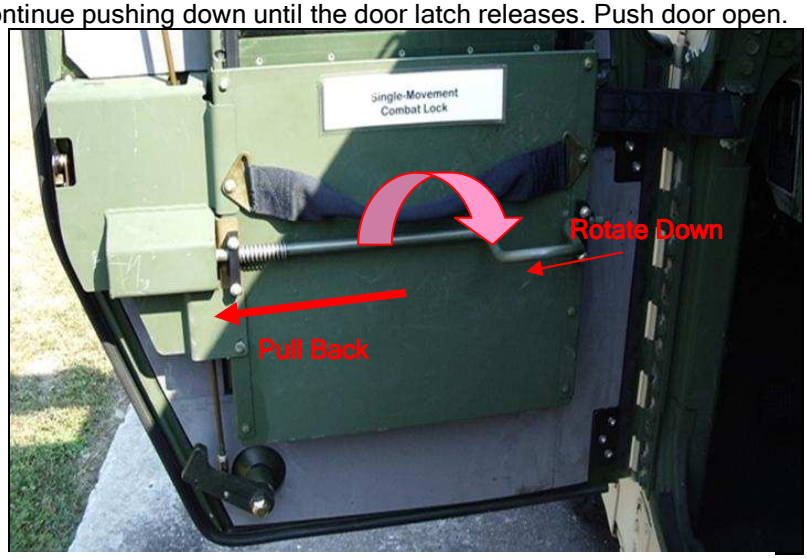

Figure 0013-005 Combat Locks-Disengaged

NOTE

There is an additional lock on the top rear of each door of the HEAT. This door lock is used for training purposed by the operator to simulate a door that will not open after a rollover. It operates by lifting up to open and pulling down to lock.

Figure 0013-006 Training Lock

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

GUNNER'S CAGE

General Information

Tools and Special Tools
None

References
TM 9-2320-387-10
TM 9-HEAT-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

OPEN GUNNER'S HATCH

1. To open the Gunners Hatch, grasp the handle with a firm grip and pull in the direction away from the latch (toward the rea of the cab assembly) until the window is completely open.

Figure 0014-001 Gunner's Handle

NOTE
The Gunner's Hatch will lock in place when the window is completely open.

Figure 0014-002 Gunner's Hatch Open

2. To close the hatch, firmly grasp the handle and pull towards the front of the cab assembly and the latch until the window completely closes.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

START AND STOP 25°, 30°, 90°, 180° AND 360° ROTATIONS

General Information

Tools and Special Tools
None

References
TM 9-HEAT-387-10
TM 9-2320-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

START AND STOP ROTATIONS

NOTE
Crewmembers will only enter the HEAT upon the operator's command.

NOTE
Explain to the crew members before entering cab assembly, if there is any type emergency or any condition, i.e., safety, illness, etc, shout the word RESCUE and the operate will immediately stop the rotation and return HEAT to the upright position.

NOTE
All direction and orientation of rotation is from the front operator's location.

1. Ensure that the motor power switch is off and the E-stop is engaged.

NOTE

Heat will not rotate when motor power is in the Off position.

2. Turn the master power key switch (2) to the right; the red power light (3) will illuminate.
3. Turn crew display panel on.
4. Using mic toggle (9) check for verbal communication between operator and crewmembers.
5. Perform safety checks
   - Ensure the Gunners cage slider door is in the closed position.
   - Ensure the Gunner's hatch on M1114 cab is in the open locked position
   - Ensure all windows are up and in the locked position. Have crewmembers response that their window is up and in the locked position.
   - Ensure that no personnel or objects are within 6 ft of HEAT assembly during rotation.
   - Ensure all personnel are secured to cab assembly using seat belt. Have crew response seat belts are secure.
   - Ensure all doors are combat locked. Have crewmembers confirm the doors are secure. Verify doors are combat locked from the crew display panel.
   - Check with assistant operator/trainer that all is clear.
6. Set motor power (10) to the On position and disengage the E-stop (6).
7. Check battery level indicator (5) before starting any rotations. Battery level bars should show four or more before using Heat.

WARNING

Injury to personnel may occur. If battery gauge is low do not start rotation.

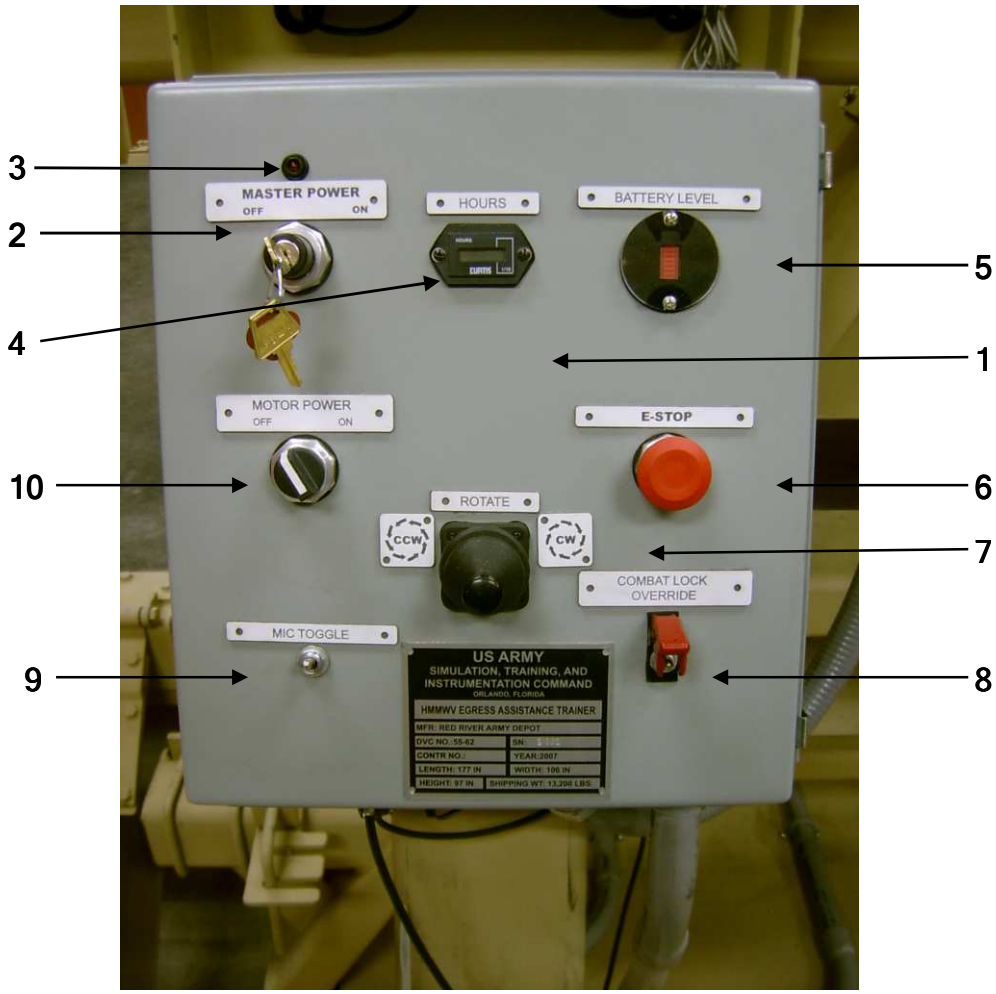

Figure 0015-001 Operator's Control Panel

8. If battery level indicator (5) displays in the low red allow time for HEAT batteries to charge before starting any rotations.

WARNING

If you hear the word RESCUE during any rotation, immediately return HEAT to 0º positions.

9. Observe HEAT and the crew display panel and listen to the crew members while moving the ROTATE (CCW) (7) to the left until the cab assembly is in a 30˚ position or ROTATE (CW) (7) to the right (7) 30˚ until the cab assembly is in 330˚ position. If everything operates properly, rotate the cab assembly back to 0˚ position.

NOTE

On an incline of 25˚, the up-armored HMMWV is likely roll over. The center of gravity changed from 30˚ to 25˚, when the HMMWV was modified with the up-armor. Rotating HEAT to 25˚ and 30˚ demonstrates this change

10. Observe HEAT and the crew display panel and listen to the crew members while moving the ROTATE (CCW) (7) to the left (7) 25˚ until the cab assembly is in 25˚ position or ROTATE (CW)

(7) to the right 25˚ until the cab assembly is in a 335˚ position. If everything operates properly, rotate the cab assembly back to 0˚ position.

11. Observe HEAT and the crew display panel and listen to crew members while moving the ROTATE (CCW) (7) to the left (7) 90˚ until the cab assembly is in 90˚ position or ROTATE (CW) (7) to the right 90˚until the cab assembly is in a 270˚ position.

    - Set motor power switch (10) to the Off position.
    - Engage E-stop button (6) to in position.
    - Using mic toggle (9) order crew to evacuate HEAT cab assembly through the gunner's cage sliding door.
    - After crewmembers have egressed, the assistant operator/trainer will disengage one combat lock in the cab assembly.
    - Assistant operator/trainer will close gunner's cage sliding door.
    - Disengage E-stop button and turn motor power On.
    - Engage the combat lock override (8).
    - Rotate cab assembly back to 0º position.
    - Engage E-stop and turn motor power Off.
    - Disengage the combat lock override.

NOTE

Perform safety checks outlined in Step 5.

12. Set motor power switch (10) to the on position and disengage E-stop (6).
13. Observe HEAT and the crew display panel and listen to crew members while moving the ROTATE (CW) (7) to the right or ROTATE (CCW) (7) to the left until the cab assembly is in an 180˚ position.

    - Set motor power switch (10) to the Off position.
    - Engage E-stop button (6) to in position.
    - Using mic toggle (9) order crew to evacuate HEAT cab assembly.
    - After crewmembers have egressed the cab close all doors.
    - Disengage E-stop button and turn motor power On.
    - Engage the combat lock override (8).
    - Rotate cab assembly back to 0º position.
    - Engage E-stop and turn motor power Off.

NOTE

Perform safety checks outlined in Step 5.

14. Set motor power switch (10) to the On position and disengage E-stop (6).
15. Observe HEAT and the crew display panel and listen to crew members while moving the ROTATE (CW) (7) to the right or ROTATE (CCW) (7) to the left until the cab assembly has made a complete 360˚ rotation and the cab-assembly is at the O˚ position.

    - Set motor switch (10) to the Off position.
    - Engage E-stop button (6) to in position.

- Using mic toggle (9) order crew to evacuate HEAT cab assembly.
- After crewmembers have exited the cab close all doors.
- Disengage the combat lock override.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

DISCONNECT POWER

General Information

Tools and Special Tools
None

References
TM 9-2320-387-10
TM 9-HEAT-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

Disconnect Power Cable from 110v/220v Wall Outlet

WARNING

Failure to place control switches in the off position may result in injury or death to personnel. All control switches must be in the off position before connecting power cord to wall outlet.

1. Check that master power switch/key (2) is removed from operator's control panel (1).
2. Check that E-stop (6) is pushed in.

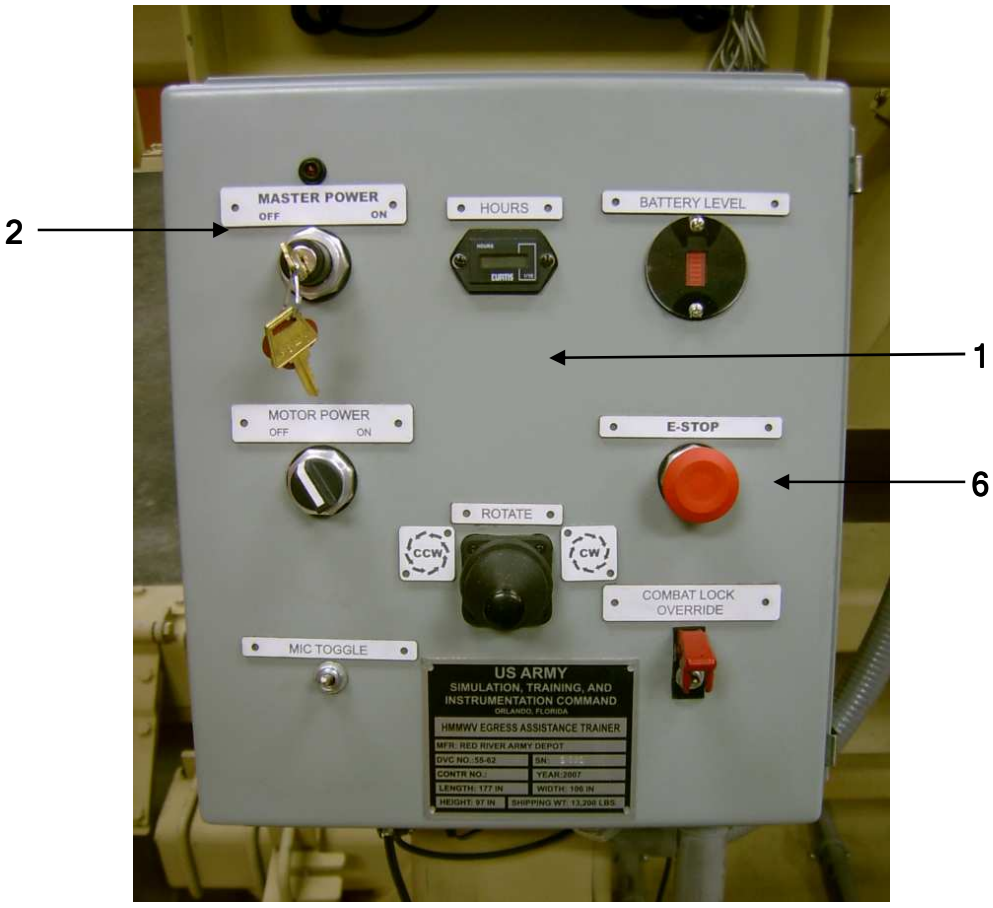

Figure 0016-001 Operator's Control Panel

3. Turn inverter (a) and charger switch (b) off.

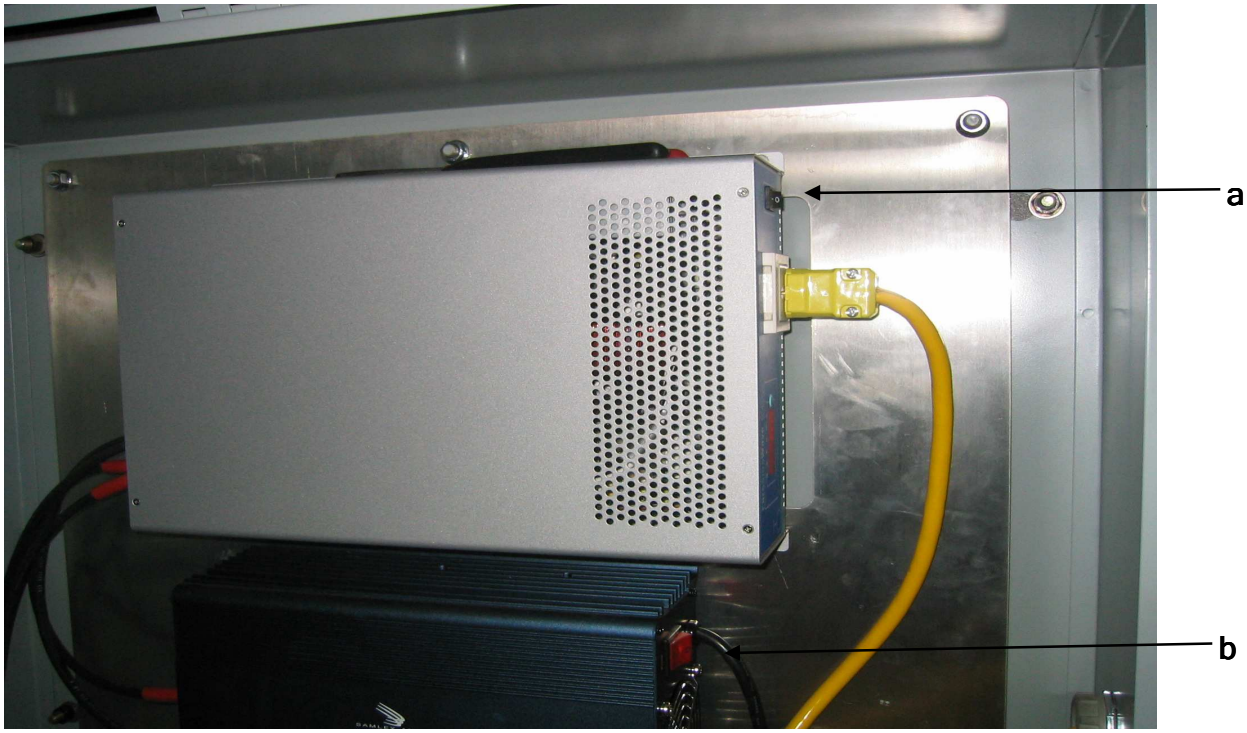

Figure 0016-002 Inverter/Charger Switch

4. Disconnect power extension cord (c) from inverter/charger box and from the 110v/220v wall outlet.

Figure 0016-003 Inverter/Charger Power Cable

.

5. Stow power extension cord inside of the inverter/charger box.
6. With two hands, close inverter/charger cover (d).

Figure 0016-004 Inverter/Charger Cover

CAUTION

Do not lean on the inverter/charger cover while open.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

OPERATION UNDER UNUSUAL CONDITIONS

General Information

Tools and Special Tools
None

References
TM 9-HEAT-387-10
TM 9-2320-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

Operation Under Unusual Conditions:

This work package contains instructions for safely operating the HEAT under unusual conditions. In addition to normal preventative maintenance service, special care must be taken to keep the HEAT operation in extreme weather conditions. This work package also includes references for decontamination of the HEAT.

Operation in Extreme Cold

1. The HEAT can be operated in conditions down to 30 degrees F.
2. Care must be taken when handling electrical cables. Cold weather can cause insulation material on electrical wire to crack, causing short circuit.
3. Do not operate HEAT in freezing rain or snow.

Operation in Extreme Heat

The HEAT shouldn't be operated at temperatures above 100 degrees F.

Operation in Sandy or Dusty Areas

When operating in sandy or dusty areas perform Monthly PMCS, Weekly and Quarterly PMCS Monthly.

Operation in High Wind

Keep all loose objects secured or stowed.

Operation in Rain

When rain is expected, a drain trench should be dug around the HEAT outside perimeter to collect and drain the water away.

Chemical, Biological, Radiological, and Nuclear (CBRN)

NOTE

Detailed Decontamination and Protection procedures can be found in FM 3-11.4 and FM 3-11.5.

END OF WORK PACKAGE

CHAPTER 3

OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)
FOR
HEAT (HMMWV EGRESS ASSISTANCE TRAINER)

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PREVENTATIVE MAINTENANCE

PREVENTATIVE MAINTENANCE CHECKS AND SERVICES (PMCS) CHECKLIST

General Information

Tools and Special Tools
None

References
TM 9-2320-387-10
DA PAM 735-750
TM 9-HEAT-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

PMCS Designated Intervals

NOTE

Designated intervals are performed under usual operating conditions. PMCS intervals must be performed more frequently when operating under unusual conditions.

1. BEFORE checks and services of PREVENTIVE MAINTENANCE must be performed prior to placing vehicle or its components in operation.
2. DURING checks and services of PREVENTIVE MAINTENANCE must be performed while the vehicle and/or its components/systems are in operation.
3. AFTER checks and services of PREVENTIVE MAINTENANCE are performed upon completion of mission.
4. WEEKLY checks and services of PREVENTIVE MAINTENANCE are performed once every 7 days.
5. MONTHLY checks and services of PREVENTIVE MAINTENANCE are performed once every 30 days.

Procedures

1. For troubleshooting malfunctions, refer to WP 0019 or notify your supervisor.
2. Use DA Form 2404 or DA Form 5988-E (automated) and report malfunctions to supervisor at once.

Trouble spots

NOTE

Dirt, grease, oil, and debris may cover up a serious problem. Clean as you check. Following precautions printed on container, use dry cleaning solvent (SD-3) on all metal surfaces. On rubber or plastic material, use soap and water.

1. Check all bolts, nuts, and screws. If loose, bent, broken, or missing, either tighten or report conditions on DA Form 2404 or DA Form 5988-E (automated) to supervisor at once.
2. Look for loose or chipped paint, and rust or cracks at welds. Remove rust and loose paint, and spot-paint as required. If a cracked weld is found, it should be reported to supervisor.
3. Inspect electrical wires and connectors for cracked or broken insulation. Also look for bare wires and loose or broken connections. Tighten loose connections. Report other problems to supervisor.
4. Check hinges for security and operation.

5. Check data, caution, and warning plates for security and legibility.
6. Not Ready/Available. If the trainer is not able to perform the mission, equipment will be reported as not ready/available. Refer to DA Pam 738-750.
7. Correct Assembly or Stowage. Check each component for installation as an assembly to ensure it is in the right place, and has no missing parts.

Fluid Leakage: Wetness around seals, gaskets, fittings, or connections indicates leakage. A stain also denotes leakage. If a fitting or connector is loose, tighten it. If broken or defective, report it. Use the following as a guide:

1. Class I. Leakage indicated by wetness or discoloration, but not great enough to form drops.
2. Class II. Leakage great enough to form drops, but not enough to cause drops to drip from item being checked/inspected and reported to your supervisor or to Field Maintenance.
3. Class III. Leakage great enough to form drops that fall from the item being checked/inspected and reported to your supervisor or to Field Maintenance.

WARNING

Failure to do this may result in damage to HEAT and/or components. When operating with class I or II leaks, check fluid levels more frequently. Class III leaks must be reported immediately to your supervisor.

CAUTION

Loose, cracked, broken, or missing hardware may result in injury to personnel or damage to equipment. When checking/servicing an item, ensure that all attaching/mounting hardware is properly secured... WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR

CAUTION

Incorrect installation may cause equipment damage or failure. During PMCS ensure that components and assemblies are correctly installed.

START PMCS

WARNING

Injury to personnel or damage to equipment may result if all WARNINGS, CAUTIONS, and NOTES are not followed while performing PMCS

ITEM NO	INTERVAL	ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF
1.	Before	**Cab Assembly**	Visible check for cracks dents and sharp edges	If cracked or sharp edges are found
	Before	a. Cab Mounts, and Retaining Bracket hardware	Loose, Missing or Damaged Hardware	Loose or missing or damaged hardware
	Before	b. Seatbelts	Loose, Missing or Damaged Hardware	Loose or missing or damaged hardware

ITEM NO	INTERVAL	ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF
	Before	c. Cameras	Check for cracks dirt or damage. Missing rubber protection bumper pads.	Cracked, Dirty or damage. Missing rubber protection bumper pads
	Before	d. BII Items	Check that all BII items are securely stowed	Un-stowed Items
	Before	e. Speakers and Microphone	***note requires two personnel** Check speakers and microphone for loose or missing or damaged hardware and function correctly	Loose or missing or damaged hardware Not Function Properly
	Before	f. Doors, Windows and Gunner's Hatch	Check operation of doors, windows and gunner's hatch	Not Function Properly
2.	Before	**Base Platform**	Visible check for cracks dents and sharp edges	If cracked or sharp edges are found
	Before	a. Inspect front AV Power Outlet	Loose, Missing or Damaged Hardware	Loose or missing or damaged hardware Not Function Properly
	Before	b. Side platform motion	Loose, Missing or Damaged Hardware Check binding and rolling out and in function	Loose or missing or damaged hardware Not Function Properly
	Before	c. Side platform Steps and Leg Supports	Loose, Missing or Damaged Hardware Check binding and rolling out and in function	Loose or missing or damaged hardware Not Function Properly
	Before	d. Side platform Roller Guilds and Supports Rollers	Loose, Missing or Damaged Hardware Check for serviceable Guilds and Rollers	Loose or missing or damaged hardware Un-Serviceable
	Before	e. Side platform Locking Pins	Loose, Missing or Damaged Hardware	Loose or missing or damaged

ITEM NO	INTERVAL	ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF
			Check Side platform Locking Pin function	hardware Not Function Properly
3.	Before	**Upper and Lower Cab Support Platform**	Visible check for cracks dents and sharp edges	If cracked or sharp edges are found
	Before	Inspect Screws washer and Nuts	Loose, Missing or Damaged Hardware	Loose or missing or damaged hardware
4.	Before	**Gunner's Cage Escape Slider Door**	Loose, Missing or Damaged Hardware Open and Close Slider Door	Loose or missing hardware Not Function Properly
5.	Before	**Encoder**	Loose, Missing or Damaged Hardware or Worn Belt	Missing or Damaged Belt
6.	Before	**Front Operators Controls**	Loose, Missing or Damaged Hardware	Loose or missing hardware
7.	Before	**Batteries and Components**		
	Before	a. Battery hold down straps and hardware	Check for missing or damaged battery hold down straps.	Missing or Damaged
	Before	b. Inverter and battery cables	Check for missing, loose, or damaged inverter and battery cables	Loose, Missing or Damaged
	Before	c. Battery Box	Check for missing, loose, or damaged battery box	Loose, Missing or Damaged
8.	Before	**Front Operators Controls** Conduct Function Test See WP 0010	**WARNING** **This is done without Crewmembers in Cab Assembly. Failure to comply may cause injury or death to crewmembers** Attempt function Test	Not Function Properly
9.	During	Crew Display Panel	Check for open doors, battle over ride or e-	Not Function Properly

ITEM NO	INTERVAL	ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF
		See WP 0008	stops display on panel	
10.	During	Battery Bar Gauge	Check Battery bar gauge does not go below three bars.	Notify field Maintenance
11.	During	Rotation	Check HEAT assembly for any unusual noise or excessive vibration during rotation.	Notify field Maintenance
12.	After	HEAT Assembly	Clean Entire HEAT Assembly	Inner Cab Debris
13.	Monthly	Gearbox Lubrication	Check For proper Fluid amount	Not Full
14.	Monthly	HEAT Assembly: Paint, BII and Rubber Protective items	Check for missing, loose, or damaged Paint, BII and Rubber Protective items	Damaged

Table 0018-001 PMCS List

END OF WORK PACKAGE

CHAPTER 4

TROUBLESHOOTING PROCEDURES
FOR
HEAT (HMMWV EGRESS ASSISTANCE TRAINER)

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TROUBLESHOOTING

TROUBLESHOOTING PROCEDURES

General Information

Tools and Special Tools
HEAT

References
TM 9-2320-387-10
DA Pam 738-750
TM 9-HEAT-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

General

a. The following troubleshooting work packages provide the necessary troubleshooting procedures to diagnose mechanical and electrical malfunctions for the HEAT.

b. The symptom index is used to identify the malfunction and locate the troubleshooting procedure to diagnose the problem.

c. Each troubleshooting procedure lists a description of the malfunction followed by a step or sequence of steps to perform a test or inspection. Then, in the order of probability, sub steps instruct the user to determine if a condition exists through a check, inspection, or test, followed by the corrective action required to solve the malfunction.

d. Prior to performing any troubleshooting procedure, the following recommendations should be observed:

(1) Isolate the system where the malfunction occurs.

(2) Perform the troubleshooting procedure in the order in which steps are listed.

(3) Consider the possibility that the problem could be simple in origin and may require only a minor adjustment; use common sense.

(4) If a malfunction occurs that is not listed, notify your supervisor.

(5) If a problem cannot be corrected after performing all corrective actions listed for a malfunction, notify your supervisor.

e. If the corrective action is not authorized at the operator's level, operators should provide a brief written description of the problem using Equipment Inspection and Maintenance Worksheet, DA Form 2404 or DA Form 5988-E, and Maintenance Request, DA Form 2407.

Start Troubleshooting

MALFUNCTION No.	MALFUNCTION	TROUBLESHOOTING NO. WP-PAGE
1	Power will not turn on	0019 00-2
2	Cab assembly will not rotate	0019 00-2
3	Crew display panel will not turn on	0019 00-2
4	Cameras are not displaying on crew display panel	0019 00-3
5	Speakers and mic's are not working	0019 00-3
6	Degree on crew display panel does not change	0019 00-3

Table 0019-001 Trouble Shooting

1. **POWER WILL NOT TURN ON**

Step 1. Check position of master power.

Set master power to ON position.

Step 2. Check power cable (110v.220v.) is connected to power source properly.

a. Connect power cable.

b. Check that battery cables are tight.

Step 3. Check batteries gauge for low bar displayed.

a. If gauge will not display any bars, check that battery cables are tight.

b. If none of these steps correct the malfunction, set master power to OFF position and notify supervisor.

END OF TESTING

2. **CAB ASSEMBLY WILL NOT ROTATE**

Step 1. Check that power light is on and battery gauge displays four plus bars.

a. If gauge will not display any bars.

b. Check that motor power is in the ON position

Step 2. Check crew display panel for any open door switch displayed on panel.

a. Reopen and close all doors completely.

b. Use combat lock override

Step 3. Check crew display panel for any E-stop engaged on panel.

Check that E-stops are pulled to the full open position.

Step 4. Check all cable connections for damage or loose connections.

a. Report any damage to supervisor.

b. Tighten all connections.

Step 5. Check for obstructions between cab assembly and platforms.

Remove obstruction

Step 6. Check the transport anchor hook.

a. Disconnect the transport anchor hook if hooked.

b. If none of these steps correct the malfunction, set master power to OFF position and notify supervisor.

END OF TESTING

3. **CREW DISPLAY PANEL WILL NOT TURN ON**

Step 1. Check all cable connections for damage or loose connections.

a. Set master switch to ON position.

b. Check for any visible damage.

c. Tighten all connections.

d. If none of these steps correct the malfunction, set master power to OFF position and notify supervisor.

END OF TESTING

4. CAMERAS ARE NOT DISPLAYING ON CREW DISPLAY PANEL

Step 1. Check all cable connections for damage or loose connections.

a. Check for obstruction over camera lens.

b. Check for any visible damage.

c. Tighten all connections.

d. If none of these steps correct the malfunction, set master power to OFF position and notify supervisor

END OF TESTING

5. SPEAKERS AND MIC'S ARE NOT WORKING

Step 1. Check all cable connections for damage or loose connections.

a. Check for any visible damage.

b. Tighten all connections.

Step 2. Check mic toggle for damage.

a. Mic toggle switch should reset to off position. (Front operator's only)

b. If none of these steps correct the malfunction, set master power to OFF position and notify supervisor

END OF TESTING

6. DEGREE ON CREW DISPLAY PANEL DOES NOT CHANGE

Step 1. Check all cable connections for damage or loose connections.

a. Check for any visible damage.

b. Tighten all connections.

Step 2. Check the encoder belt.

a. Check encoder drive belt for cracks and deterioration

b. If wear appears to be excessive, set master power to OFF position and notify supervisor.

END OF TESTING

END OF WORK PACKAGE

CHAPTER 5

SUPPORTING INFORMATION
FOR
HEAT (HMMWV EGRESS ASSISTANCE TRAINER)

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SUPPORTING INFORMATION

REFERENCES

General Information

Tools and Special Tools
None

References
TM 9-2320-387-10
TM 9-HEAT-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

References

Publications Index

The following index should be consulted frequently for latest changes or revisions and for new publications relating to material covered in this manual. DA Pam 750-8, The Army Maintenance Management System (TAMMS)

Forms

The following forms pertain to this manual. See DA Pam 25-30 for index of blank forms. See DA Pam 750-8, The Army Maintenance Management System (TAMMS), for instructions on the use of maintenance forms pertaining to this manual.

DD Form 250	Material Inspection and Receiving Report
DD Form 314	Preventive Maintenance Schedule and Record
DA Form 2028	Recommended Changes to Publications and Blank Forms
DA Form 2404/5988-E	Equipment Inspection and Maintenance Worksheet
DA Form 2407	Maintenance Request
DA Form 2408-9	Equipment Control Record

Field Manuals

FM 3-11.4	Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NBC) Protection
FM 3-11.5	Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Decontamination
FM 5-34	Engineer Field Manual
FM 4-25.11	First Aid

Technical Manuals

TM 9-2320-387-10	Operator's Manual for Truck, Utility: S250 Shelter Carrier, 4X4, M1113 (NSN 2320-01-412-0143) (EIC: B6B), Truck, Utility: Up-Armored Carrier, 4X4, M1114 (2320-01-413-3739)(EIC: B6C)
TM 9-247	Materials Used for Cleaning, Preserving, Abrading, and Material and Related Materials Including Chemicals Cementing Ordnance

Technical Manuals Cont.

TM 43-1043	Equipment Improvement Report and Maintenance Summary
TM 743-200-1	Storage and Materials Handling
TM 750-244-6	Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use

Technical Bulletins

TB 43-0142	Safety, Inspection and Testing of Lifting Devices
TB 43-0209	Color, Marking, and Camouflage Painting of Military Vehicles
TB 43-0002	Maintenance Federal Supply Class (FSC) 54

Training Support Package

TSP 551-HEAT	HMMWV Egress Assistance Trainer (HEAT)

Other Publications

AR 750-1	Army Materiel Maintenance Policy
ASME Y14.38	Abbreviations & Acronyms
CTA 50-970	Expendable/Durable Items (except Medical, Class V, Repair Parts, and Heraldic Items)
GTA 55-03-030	HMMWV Up-Armored Rollover Emergency Procedures Performance Measures
MIL-PRF-2104	Lubricating Oil, Internal Combustion Engine, Combat/Tactical Service

END OF WORK PACKAGE

SUPPORTING INFORMATION

BASIC ISSUE ITEMS (BII)

General Information

Tools and Special Tools
None

References
TM 9-2320-387-10
TM 9-HEAT-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

BASIC ISSUE ITEMS (BII)

This work package lists the Basic Issue Items (BII) for the HEAT. This list will help inventory items required for safe and efficient operation.

General

These are the minimum essential items required to place the HEAT in operation. The list will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on Table of Organization and Equipment/Modified Table of Organization and Equipment (TOE/MTOE) authorization of the end item.

Explanation of Columns
The following provides an explanation of columns found in tabular listings:

a. **Column (1)—Illustration Number (Illus Number).** This column indicates the number of the illustration in which the item is shown.

b. **Column (2)—National Stock Number/Parts Number.** Indicates the national stock number or parts number assigned to the item and will be used for requisitioning purposes.

c. **Column (3)—Description.** Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the Commercial and Government Entity Code for Manufacturer (CAGEC) for (in parentheses), followed by a part number.

d. **Column (4)—Unit of Measure (U/M).** Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g.: ea, in., pr).

e. **Column (5)—Quantity Required (Qty Rqr).** Indicates the quantity of the item authorized to be used with/on the HEAT.

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER/PARTS NUMBER	(3) DESCRIPTION USABLE CAGEC AND PART NUMBER ON CODE	(4) U/M	(5) QUANTITY REQUIRED
1	FM 10 5.56 can-S1	5.56 cal ammo can	ea	2
2	FM10 7.62 cal can-S1	7.62 cal ammo can	ea	2
3	FM 25 M16-S1	M16 Rifles	ea	4
4	FM10 50cal can-S1	50 cal ammo can	ea	2
5	FM10 WB-S1	Water bottles	ea	4
6	RW-S1	Rescue wrench	ea	1
7	4240-01-542-8160	Harness Assembly	ea	1

Table 0021-001 Basic Issue Items (BII)

END OF WORK PACKAGE

SUPPORTING INFORMATION

RISK ANALYSIS WORKSHEET

General Information

Tools and Special Tools
None

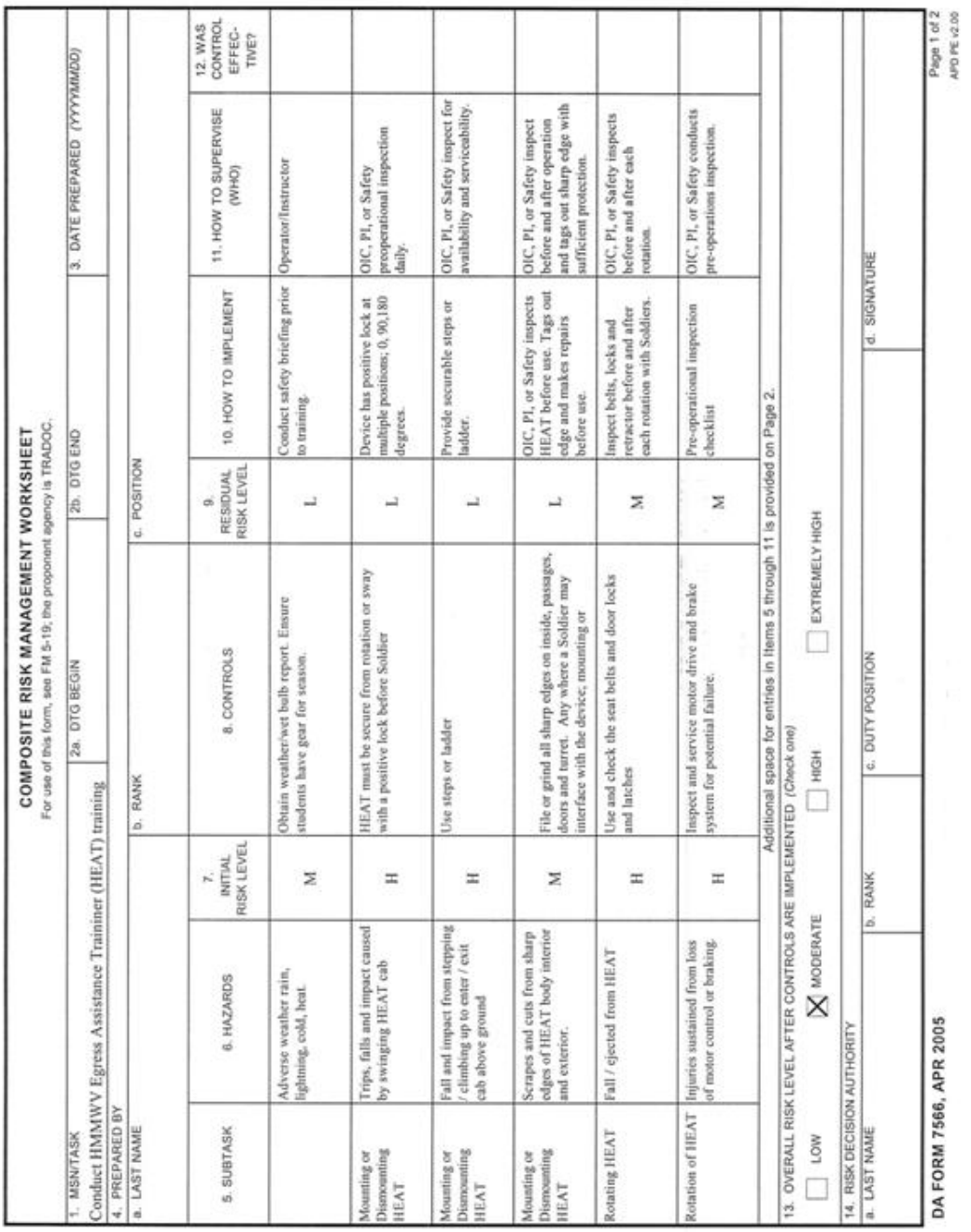
References
TM 9-2320-387-10
TM 9-HEAT-387-10

Personnel Required
Two GPU

Equipment Conditions
Operational

RISK ANALYSIS WORKSHEET

On the next page is the Risk Analysis Worksheet for HEAT. The HEAT Risk Management Worksheet should be reviewed for any local expansions necessary for compatibility with the unit's mission essential task list (METL).



COMPOSITE RISK MANAGEMENT WORKSHEET

For use of this form, see FM 5-19; the proponent agency is TRADOC.

1. MSN/TASK	2a. DTG BEGIN	2b. DTG END	3. DATE PREPARED (YYYYMMDD)
Conduct HMMWV Egress Assistance Traininer (HEAT) training			

4. PREPARED BY

a. LAST NAME	b. RANK	c. POSITION

5. SUBTASK	6. HAZARDS	7. INITIAL RISK LEVEL	8. CONTROLS	9. RESIDUAL RISK LEVEL	10. HOW TO IMPLEMENT	11. HOW TO SUPERVISE (WHO)	12. WAS CONTROL EFFEC-TIVE?
	Adverse weather rain, lightning, cold, heat.	M	Obtain weather/wet bulb report. Ensure students have gear for season.	L	Conduct safety briefing prior to training.	Operator/Instructor	
Mounting or Dismounting HEAT	Trips, falls and impact caused by swinging HEAT cab	H	HEAT must be secure from rotation or sway with a positive lock before Soldier	L	Device has positive lock at multiple positions; 0, 90,180 degrees.	OIC, PI, or Safety preoperational inspection daily.	
Mounting or Dismounting HEAT	Fall and impact from stepping / climbing up to enter / exit cab above ground	H	Use steps or ladder	L	Provide securable steps or ladder.	OIC, PI, or Safety inspect for availability and serviceability.	
Mounting or Dismounting HEAT	Scrapes and cuts from sharp edges of HEAT body interior and exterior.	M	File or grind all sharp edges on inside, passages, doors and turret. Any where a Soldier may interface with the device; mounting or	L	OIC, PI, or Safety inspects HEAT before use. Tags out edge and makes repairs before use.	OIC, PI, or Safety inspect before and after operation and tags out sharp edge with sufficient protection.	
Rotating HEAT	Fall / ejected from HEAT	H	Use and check the seat belts and door locks and latches	M	Inspect belts, locks and retractor before and after each rotation with Soldiers.	OIC, PI, or Safety inspects before and after each rotation.	
Rotation of HEAT	Injuries sustained from loss of motor control or braking.	H	Inspect and service motor drive and brake system for potential failure.	M	Pre-operational inspection checklist	OIC, PI, or Safety conducts pre-operations inspection.	

Additional space for entries in Items 5 through 11 is provided on Page 2.

13. OVERALL RISK LEVEL AFTER CONTROLS ARE IMPLEMENTED *(Check one)*

☐ LOW ☒ MODERATE ☐ HIGH ☐ EXTREMELY HIGH

14. RISK DECISION AUTHORITY

a. LAST NAME	b. RANK	c. DUTY POSITION	d. SIGNATURE

DA FORM 7566, APR 2005

Page 1 of 2

APD PE v2.00

Table 0022-001 Risk Analysis Worksheet

END OF WORK PACKAG

INDEX

NOTE: This index is organized alphabetically by key words, and identified by page number.

INDEX (Cont)

INDEX (Cont)